Indian Institute of Technology Bombay

annual report
2011-12

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Director's Report

Introduction

IIT Bombay continues to be rated as one of the leading 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 fifty-three years of its existence, over 40,000 students have graduated from its portals. 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 faculty members internationally reputed for their research contributions. I am happy to note that the institute continues to attract top quality academics to its faculty. The institute also continues to build links with peer universities and institutes, both at national and international levels, to enhance research and educational programmes. IIT Bombay alumni have distinguished themselves through their achievements and contributions in industry, academics, research, business, government and in social domain. The institute continues to work closely with the alumni for enhancing its activities through interactions in academic and research programmes as well as mobilising financial support.

The highest priority of the institute is to intensify its research efforts. The aim is to focus on "Research that Makes a Difference" to society, to industry and to the field itself. We are in the midst of a significant expansion in infrastructure to meet the ever increasing academic and research needs. A detailed report of the progress of the institute follows.

Academic Programme

IIT Bombay has taken several new initiatives in restructuring and strengthening its academic programmes at postgraduate and undergraduate levels in the past few years. A new curriculum for undergraduate students was introduced in 2007. The two-year M.Sc. programme was reviewed and a six-year M.Sc.-Ph.D. dual degree programme was introduced in 2008. An M.Tech.- Ph.D. dual degree programme was introduced in 2009. The new M.Sc. and M.Tech. programmes, at the postgraduate level, with a focus on research and development are the crucial factors that have helped in the recognition of IIT Bombay as a premier institute of higher learning. 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 options to choose from, has raised their level of enthusiasm for academics. The opportunity for Minor has been subscribed heavily by all the batches of students in the new curriculum and around 80 per cent of the eligible students have signed up consistently every semester. This year, 140 students are passing out with Honors and Minor, of which 62 are with Honours, 106 are with Minor and 28 with both.

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. Among 15 IITs in the country, 78 of the top 100 rankers in JEE 2012 have joined IIT Bombay and eight of the top 10 All-India JEE rank holders have chosen to join IIT Bombay. Similar trends are observed for the candidates qualifying in other entrance examinations as well.

The characteristics of the student population at the institute are undergoing a significant change in the recent times. The on-roll strength in 2007-08 was 5285 students of which 2196 (41.5%) were undergraduates (UG) and 3089 (58.5%) postgraduates (PG). During 2011-12, the on-roll strength has increased to 7782 of which 3129 (40 %) are UG students and 4653 (60%) are PG students. With the existing programmes, the UG population will saturate at 3415 (31%) in the academic

year 2013-14, while the PG population will saturate at 7601 (69%) during the year 2018-19, with a total of 11062 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 using it as a great opportunity to retain its leadership in engineering education.

The Ph.D. student strength has been steadily increasing. While we had 771 Ph.D. students on roll in the academic year 2001-02, in the academic year 2011-12 the number has risen to 2093, an increase of over 270 per cent in a span of just 10 years. We are on course to achieve our target of 2775 Ph.D. students, i.e., approximately, 30 per cent on roll among 11062 students in the academic year 2018-19. On the Ph.D. output front, as compared to 73 Ph.D. degrees awarded in 2001, the numbers were 200, 179, 179 and 173 in the years 2008-09, 2009-10, 2010-11 and 2011-12, respectively. An interesting aspect of our Ph.D. output, observed in the recent years, is the fact that around 65 per cent of the degrees are in the engineering disciplines. All students involved in research in the institute are given an opportunity to interact with research community at the national and international level by providing funds to attend international conferences. While the research scholars are the primary beneficiary of this scheme, some other PG students (including dual degree) and UG students have also benefited. The annual funding has been enhanced from Rs. 125 lakhs last year to Rs. 160 lakhs this year. With effect from January 2010, the funding for participation in international conferences has been enhanced to Rs. 60,000/- for North America 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 2011-12, 160 students were granted financial assistance for attending international conferences as against 140 for the previous year.

The Institute Student Mentor Programme has been operating successfully for several years. The programme, which provides a support structure for the undergraduates and which aims largely at the first and second year students, is essentially managed by senior students under the supervision of a faculty coordinator. This programme has been extended to mentor-needy senior students at the departmental level. For undergraduates, whose academic performance does not meet the requirements for continuation in their programmes, a final chance for continuation in the form of the Academic Rehabilitation Programme (ARP) has been effective since 2008-09. A Senate-appointed committee prescribes a customised academic load for ARP students, 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 for the postgraduates, gives a PG student a second chance to continue in the programme.

Encouraged by the enthusiastic and effective participation of students in various aspects of academic administration, several mechanisms to channelize and structure the energy of the students in creative and constructive activities have been devised and are operational.

Practical Training Cell: This is a student initiative aimed at providing internships, projects and industry training opportunities to the students of IIT Bombay in research laboratories and companies across the globe with the support of the Dean (AP) Office. A team of 25 hard working and able students with representatives from each department is responsible for searching, locating, identifying, evaluating and contacting potential recruiters, keeping in mind the industry trend, the inclinations and the best interests of the students. A total of 650 summer interns were placed via Practical Training Cell in the academic year 2011-12, both in India and abroad, as against 345 in the previous year. The total interns placed in summer and winter were 539 and 111, respectively. The cell has now started functioning under the Placement Office.

UG Teaching Assistantship: In an effort to make the senior UG students more self-sufficient, responsible and oriented towards academics, UG Teaching Assistantship was introduced during the academic year 2009-10. This year, 207 UG teaching assistants (103 in Spring Semester and 104 in Autumn Semester) were appointed to assist the faculty in conducting the various UG courses.

STUDe Club: This is an initiative under the Dean (AP) Office to set up programmes targeting the overall development of a student. The club helps students achieve their cherished desires. It has conducted motivational seminars every month by eminent invited speakers and technical workshops each semester, in addition to publishing its newsletter and maintaining its Web site.

English Remedial Classes: The classes were envisioned in the summer of 2009 with the objective of identifying the first year students who have not had sufficient exposure to the English language and helping such students to acquire basic English language skills that might be needed in the course of their academic career in the institute. The classes were run on a trial basis for a year and have been confirmed with the help of professionals appointed under the aegis of the Cell for Human Values.

Augmentation of our academic infrastructure, instructional and laboratory facilities and human resource have been planned carefully to meet the challenges ahead. With its forward looking academic plans and programmes, IIT Bombay is ready to actively participate as an important resource to enhance India's science and technology capabilities in the changing global scenario.

Research and Development Activities

The research and development at IIT Bombay continued its growth trajectory, from Rs.100 crores in 2009-10 to Rs.193 crores in 2011-12 (a compound annual growth rate of 39%). Figure 1 shows the growth of research funds in the last few years. The revenue includes the Rs.2.2 crores received through licensing of IITB R&D intellectual property and know-how.

Figure 1: Growth of R&D receipts in the last decade

R&D Activities

During the year 2011-12, new R&D projects were initiated in all areas of science and engineering and social sciences, typically ranging from two to five years duration. These included short-term consulting projects and long-term sponsored research projects (Table 1).

Year	Sponsored projects		Consultancy	
	Number	*Sanctioned* outlay *(Rs. in crores)*	*Number*	*Project outlay (Rs. in crores)*
2009	210	160.0	-	-
2010	229	174.0	460	23.6
2011	210	182.0	510	23.0

Table 1: Information on new projects sanctioned in 2011-12

External Grants for R&D

The total grants received for R&D during 2011-12 were Rs.193.28 crores (Table 2). This includes grants received during the year for new and ongoing projects.

Project Type	Number	Funds *received (Rs. in crores)*
Sponsored	460	167.7
Consultancy	580	22.2
Royalty	-	2.2
Equipment usage charges	-	1.1
Total		193.2

Table 2: Grants for R&D in 2011-12

The R&D work continued to be mainly supported by government entities (Figure 2 and Table 3). The industry funding of Rs. 27 crores showed an enhancement of nearly 22 per cent compared to the previous year. Table 4 provides a list of some of the major industry sponsors.

Figure 2: Distribution of earnings from different agencies

Table 3: Main Sponsors

Agencies	Grants received (Rs. in crores)	Number of new/ ongoing projects funded
Department of Information Technology	36.8	27
Ministry of Human Resource Development	35.0	6
Department of Science and Technology	34.5	135
Department of Biotechnology	7.3	28
Defence establishments (DRDO, ADA, NRB, AERB, NMRL, IGCR, NPC)	9.5	50
Indian Space Research Organisation	3.9	13
Board of Research in Nuclear Sciences	3.5	38
Council for Scientific and Industrial Research	1.4	32

Table 4: Sponsors from Industry and other Organisations

Cairn Energy India	Applied Materials
General Motors	Bill and Melinda Gates Foundation
Eaton Technologies	Google
Nokia India	Hindustan Lever
Microsoft	ICICI
Netapp India	Intel
NPC	European Commission
Samsung	MDA Singapore
Synopsys	Indo-French Cooperation programme
IBM	Indo-German Science and Technology
Samsung C&T Corporation, Korea	Centre
Trisoplast Mineral Liners, Netherlands	Aerospace Research and Development, USA
	Air India
	Jawaharlal Nehru Port Trust
	Municipal Corporation of Greater Mumbai
	Piramal Realty Pvt Ltd.
	Power Grid Corporation of India Ltd.
	State Bank of India
	The Bombay Dyeing & Manufacturing Co. Ltd.

Some major sponsored projects initiated

- Augmenting/maintaining the existing Centre for Excellence in Nanoelectronics to undertake basic and applied research Funding agency: Department of Information Technology Sanctioned outlay: Rs. 81.8 crores over five years
- National Facility on Electron Probe Micro-Analyser Funding agency: Department of Science and Technology Sanctioned outlay: Rs.9.8 crores over a period of five years
- Centre of Excellence in Climate Studies to focus on multi-disciplinary, long-term research and academic programme on climate change and capacity building initiative.

  Funding agency: Department of Science and Technology
  Sanctioned outlay: Rs.8.9 crores over a period of five years
- Free/Open source software in science and engineering education to facilitate development and deployment of open source software alternatives in science and engineering education across the country

  Funding agency: Ministry of Human Resources and Development
  Sanctioned outlay: Rs.3.2 crores for one year
- Development of techniques and tools for formal verification of computer systems Funding agency: Board of Research in Nuclear Sciences Sanctioned outlay: Rs.3.1 crores for five years
- Collaborative efforts for setting up a 'Deep Social Media Research Centre' to design social connectivity targeting under-represented populations and applications

  Funding agency: Media Development Authority, Singapore
  Sanctioned outlay: Rs.1.3 crores over five years
- The first Bill and Melinda Gates Foundation project under the Grand Challenges Exploration was awarded for the project on "Nanoparticulate Cosmetics for Nutrient Delivery in Pregnancy" to improve the absorption of micronutrients in pregnant women, by using cosmetics containing such nutrients in the form of nano-particles. [IITB was one of the two Indian institutes to receive this award under the Global innovation award scheme to find solutions for pressing global health issues. Funding of Rs. 49.0 lakhs was sanctioned for a period of two years.]

Efforts were made to disseminate information and provide support to faculty regarding project funding (both national and international). This has helped in facilitating and enhancing the submission of sponsored project proposals to funding agencies which has gone up from 320 in 2009 to nearly 360 this year.

Consultancy

Consultancy activities were taken up for government, public sector and industry – both Indian and international. The types of consultancy provided include retainership, expert advice, product/process/ software development, analysis, evaluation, product design and limited testing.

Some major consultancy projects initiated

- Advice for computerisation of Octroi department
- Design of scooter operated washing machine
- Design validation for the pre-engineered building
- Environmental performance assessment studies for proposed aptive power plants
- Pilot project on inter institutional money transfer
- Green development of industrial park
- Improvement in logistics and operational efficiencies
- Mithi river development project
- Traffic impact/simulation studies, etc.

Internal grants for R&D

The institute provided internal funding for research through initiatives, supporting new faculty research and student activities. A grant of around Rs.11.0 crores was sanctioned for the purpose, and some of the activities taken up are as follows:

- Initiation of research for new faculty
- Augmenting research resources of faculty awardees of research/review paper/Young investigator awards
- Research internships
- Student research activity; projects such as "Pratham" student satellite, automotive racing project, Biosynth project, underwater vehicle project
- Upgradation of Central and National research facilities Leverage grants and bridge grants

Recognition of R&D efforts

IIT Bombay's research was recognised by peers and society in the form of awards. These awards were won by faculty, students and groups. Some of the faculty awards include the "IBM Faculty Award 2011" in the field of computer science and engineering and the "Better Opportunities for Young Scientists in Chosen Areas of Science and Technology (BOYSCAST) Fellowship-2010-11" by the DST in the field of civil engineering. Three students of the institute were among the 20 Indian innovators who received the "MIT Technology Review India Young Innovators Award" for researchers below the age of 35 years. They are

Mr. Nitin Joshi for his work on Chemotherapy through an Inhaler, Mr. Vanteru Reddy for his Research in Flameless Combustion with Liquid Fuels, and Mr. V.S.K. Murthy for his Innovation on Forecasting the Price and Load of Electricity.

Award for Excellence in Telecom Research

IIT Bombay received the TCOE Awards of Excellence 2011 for telecom research in the area of telecommunications. This is a national award instituted by the Telecom Centres of Excellence India in association with the Department of Telecommunications (DOT), Cellular Operators Association of India (COAI), Association of Unified Telecom Service Providers of India (AUSPI), and the Federation of Indian Chambers of Commerce and Industry (FICCI).

Licensing Activities

a. Technology transfers:

- Ethernet Switch Routers: A license was given to M/s. Electronics Corporation of India Ltd (ECIL), Hyderabad, to commercialise an indigenously developed low-cost, ultra fast Carrier Ethernet Switch Router in India. This includes a license fee of Rs. 22 crores and an annual royalty based on sales. The first set of products using this technology was manufactured and inaugurated at Delhi on 11 April 2012. A company has been incubated in SINE to manufacture and commercialise the products in overseas market.
- A Photovoltaic (PV)-based battery charging and cell balancing scheme was licensed to a licensing agent
- A system and method for electricity price forecasting was licensed to Kalkitech Communications Pvt. Ltd.
- Evaporative condenser technology was provided to M/s Mechworld Eco.
- A novel power efficient architecture and technique for improved amplifier was licensed to a licensing agent.
- An evaluation license to an anti-TB related technology was given to a health care company.
- Technologies related to cantilever-based sensor systems, markers for cardiac diagnostics and sensors for explosives were taken up for commercialisation through incubation in SINE.

Indigenous router for metro and data-center environments

b. Dissemination/Outreach:

- To promote and enhance licensing of technology developed at the institute, the intellectual property available for licensing was disseminated through an advertisement in leading national newspapers, fliers and electronic media, and on-line interactive processes were set up for licensing.
- For the first time, an auction of interactive Board/ Electronic games developed by the students and faculty of Industrial Design Centre and Electrical Engineering Department was held on 7 July 2011 where industries involved in child education as well as toys and games were invited. These games involved a good mix of strategic thinking, problem-solving, education and dexterity.

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- Research and development outputs were showcased through posters at the National Innovation Day held in the campus on 1 March 2012.
- IITB technologies were displayed at an exhibition organised by the Ministry of Commerce and Industry at the India Engineering Sourcing Show (IESS) 2012, Bombay Exhibition Centre, Mumbai, during March 22 to 24, 2012. In addition to posters, the demos of the student-led "Baja" race-vehicle and "Pratham" satellite were displayed.
- 'TechConnect2012' organised by students during Techfest event held between January 6 and 8, 2012,

showcased R&D exhibits from different academic units. Demos and visits to labs and facilities were also arranged.

Tech Connect 2012

National Innovation Day

Augmentation of Research Infrastructure

As part of creating and upgrading infrastructure for research and development, the institute has been processing several state-of-the-art equipment facilities. A new initiative was started during this year to fund high-end equipment/facilities through a Research Infrastructure Funding Committee (RIFC). Proposals were invited for purchase of high value facilities at the institute level for use by researchers across various academic entities. Nineteen new items of equipment worth Rs. 33.2 crores were sanctioned after extensive review. The procurement will be funded jointly with the institute internal funds. A list of the sanctioned facilities is given below:

- Magnetometer
- Field emission gun cased Cryo scanning electron microscope
- High resolution mass spectrometer
- Three dimensional particle image velocimetry
- Transmission Electron Microscopy sample preparation equipment
- MALDI-TOF/TOF Mass Spectrometer
- High –field NMR spectrometer (700 MHz)
- Phase doppler particle analyser
- Laser doppler vibrometer
- High resolution liquid chromatography mass spectroscopy
- Bio atomic force microscope
- X-ray diffractometer
- Scanning probe microscope
- A GPU supercomputing facility
- 500 MHz FT-NMR spectrometer
- Microarrayer
- Combustion facility (FTIR+GCMS+TGA+DSC)
- Friction stir welding machine
- Facility for ohmic contacts to silicon semiconductors

These are either "Central Facilities", made available to all at the institute level through an on-line submission process, or "Institute Facilities", where specific academic units are major users with limited access to other units.

In addition, several equipment/facilities were bought through project funds. Some of these are as follows:

- Automatic - Flip Chip Bonder
- Precision Lapping and polishing machine system
- Portable Sputter Coater System
- Physical Property Measurement System
- Potentiostat Galvanostat
- Electron Paramagnetic Resonance Spectrometer

Intellectual Property Protection Activities

The patenting activities were sustained during the year. On-line systems were set up, processes for patenting were simplified, a panel of attorneys was identified, and manpower with expertise in Intellectual Property rights was augmented. These resulted in increased submission of invention disclosures. The number of patent filings increased from around 20 to 60 applications in a span of three years (Figure 3 and Table 5). The increased patenting activity allowed increase in the IP portfolio and proactive efforts continued for licensing of [illegible]

Figure 3: Growth of patent applications from 2007-08 to 2011-12

Table 5: Patents filed during 2011-12

Patents	
Territory	Applications
Indian	60
PCT	20
US	10
EU	1
Trademarks and Design registrations	
Indian	12
Copyright registrations	
Indian	2

Areas of patent applications: Energy and Environment, Network, Thin films, Health Care, Refrigeration, Information and communications technology, and others

As in the previous year, proactive efforts were made to assess possible intellectual property in the theses of M.Tech./Dual Degree students – to file for possible protection. In addition, a new initiative was taken to provide printed laboratory notebooks to all researchers for documenting/recording their research experiments/ activities. This will enable systematic documentation of research and IP generation and be helpful during submission of invention disclosures for filing patents, submitting publications, etc.

More than 160 agreements were reviewed during the year for research collaboration, licensing, non-disclosure agreements, MoUs, student sponsorship, consortia formation, etc., with industries, organisations, universities and government, both at national and international levels. An online information system was set up to submit agreements, review by legal consultants and to keep track of all activities. Some of the organisations with whom agreements were signed are Nokia, Reliance, IBM, TCS, Eaton, Crompton Greaves, etc.

New Initiatives

New initiatives were taken to promote and facilitate research and development work and encourage students to focus on R&D from undergraduate level itself – to take up research that makes a difference. Some highlights are given below:

a. Enhancing industry partnership

Steps were initiated to enhance interaction with industries and to move from one-to-one research projects to a higher level partnership for large-scale R&D. The institute made efforts, in a proactive manner, to approach the industry to broaden and deepen industry linkages. To implement this, an industry liaison team was formed and a dedicated website on 'Partner with Us' was created along with a new flier on modes of partnership with industries. The requests for R&D support from industry were tracked and followed up with both faculty and industry to facilitate enhanced engagements. The team interacted with several industries and distributed fliers and brochures to disseminate information on the R&D activities of the institute. The top companies in each vertical were identified and letters seeking enhanced engagement were sent out. Activities towards organising an "Industry Meet" on 'Partner With Us: Strengthening IITB and Industry Interactions' were undertaken during the year.

Some industry visits:

Honeywell Technology Solutions, Cummins, DCNS, Nokia, Cassidian, Saint Gobain, Dassault Systèmes, Gas Authority of India Limited, Godrej & Boyce, Sony Corporation, Samsung, SABIC (GE Plastics), Toshiba-Mitsubishi Electrical Industrial Corporation, Bharat Petroleum Corporation Limited, Mazagaon Dock, Aloe Ventures, Rashtriya Chemicals & Fertilisers, ICICI Bank, Tata Consultancy Services, Powerdeal Energy Systems.

Projects have already been initiated with Eaton Corporation, Nokia and Samsung. Other representative organisations currently in discussion with for interactions are Honeywell Technology Solutions, GAIL, etc.

Applied Materials Inc. – a leading supplier of manufacturing solutions for the semiconductor, flat panel display, and solar industries – and IIT Bombay have enjoyed a successful five-year relationship in the area of nanoelectronics and solar photovoltaic technology research. During the course of this special alliance, Applied Materials has endowed IIT Bombay with over $12 million worth of high-end equipment and research grants. The collaboration was further enhanced in April 2011 through the setting up of the state-of-the-art "Chemistry Laboratory for Energy and Nanoelectronics" (CLEAN) at IIT Bombay by Applied Materials. A joint steering committee meeting was held in March 2012 and expansion of the collaboration to cover newer areas has been initiated.

IIT Bombay has had a successful multidimensional partnership with Tata Consultancy Services (TCS) during the last decade. A high level delegation meeting between TCS and IITB was held at IIT Bombay on 19 January 2012, where both delegates expressed a strong desire to further continue and enhance the existing interactions. It was also decided to set up a TCS-IITB research cell to institutionalise the collaboration between IITB and TCS.

b. Consortia/Partnership

Health Care consortium: A Western Region Health Care consortium was launched at IIT Bombay on September 7, 2011. This initiative aims to bring together technologists, engineers, scientists, clinicians and industry for fruitful interactions to meet the health care needs of the country. The current consortium members include IIT Bombay, Tata Memorial Centre, National Institute for Research in Reproductive Health, Strand Life Sciences and Span Diagnostics. A seminar on Stem Cell Research was conducted by Dr. Deepa Bhartiya, NIRRH, at IIT Bombay. A call for proposals for seed funding was also made. Four such proposals have been funded by the institute for initiating research in different aspects of health care – to formulate larger proposals to external agencies.

Climate change: This initiative, started in the previous year, has resulted in the establishment of an interdisciplinary programme, with the initiation of a Ph.D. programme. The DST funded a grant for research in this area.

National Centre for Aerospace Innovation and Research (NCAIR): Proposals to DST and DMG Mori Seiki were submitted and student projects initiated under NCAIR. The DST proposal with an outlay of Rs.25 crores has been accepted. A proposal for inclusion of Tatas into NCAIR has been initiated. Workshops on "Technical Course on Machining of Aerospace Materials" and "NADCAP Certification for Aerospace Manufacturing Processes" were held.

National Centre for Photovoltaic Research and Education (NCPRE): A 10-day workshop titled "Solar Photovoltaics: Fundamentals, Technologies and Applications" was held during December 12-22, 2011. The programme – conducted jointly with the Ministry of New and Renewable Energy and the Ministry of Human Resource Development – aims at developing manpower in Solar PV in the country and was carried simultaneously at 35 remote centres spread across the country. Teachers from more than 200 colleges participated in the workshop. A special laboratory kit was developed and distributed to all the remote centres.

National Solar Thermal Power Research Simulation and Testing Facility: A 1 MW grid-connected solar thermal plant is being set up by the IIT Bombay-led consortium at the Solar Energy Centre at Gwalpahari, near Delhi. The solar fields and power blocks have been installed and the plant is expected to be commissioned later this year.

New Interdisciplinary Research Initiatives:

- Workshops, both within the institute and with external user entities, were held to discuss a proposed Centre for Excellence in Technology for Internal Security. These included a meeting on 18 February 2012 with Maharashtra Police, DRDO, BARC and CRPF officials to discuss the mechanisms for addressing security needs of these agencies.

- A Rural Technology Action Group (RUTAG) was set up with funding from the DST to act as a technology resource centre for non-governmental and governmental organisations and to provide appropriate technology in rural areas. RUTAG has initiated activities as a resource centre for Western India, especially near Mumbai.

- Activities towards Interdisciplinary Research on Water were initiated in January 2012 through internal meetings with 30 faculty members from different departments.

c. Student initiatives

"Enthuse" activities to motivate young students to do research continued with post-dinner Talks at hostels, R&D orientation in the departments, etc. Nine visits involving around 45 faculty members were organised. A number of student research projects received funding from the institute to encourage research focus.

d. Incentives for R&D

Rewards for technology development efforts, research/review activities and industry impact were given in the form of cash awards and research grants (Table 6). Institute-wide dissemination through lectures and electronic media was also done.

Table 6: Awards given in 2011-12

Award	Number	Areas
Research Paper Award	5	Environmental Science and Engineering, Chemistry, Mathematics, Mechanical Engineering
Review Paper Award	2	Chemistry
Young Investigator Award	4	Aerospace Engineering, Biosciences and Bioengineering, Chemistry, Civil Engineering, Electrical Engineering
Industrial Impact Award	1	Electrical Engineering
Dr. P. K. Patwardhan Technology Development Award	1	Mechanical Engineering
S.C. Bhattacharya Award for Excellence in Pure Sciences	1	Chemistry
H.H. Mathur Award for Excellence in Applied Sciences	1	Chemical Engineering
Research Internship awards	36	Given to bright students across the country to undertake research at IITB for six months, based on national advertisement and selection process.

e. Dissemination/Outreach

- A number of workshops/seminars were conducted during the year to encourage project-proposal writing, sharing of IP management practices and ways of promoting innovation at national level.
- Workshop on writing research proposals: The workshop, held on November 22, 2011, taught the internal researchers on how to write successful research proposals including budgeting. Experts who had undertaken successful projects made presentations to nearly 60 participants, including faculty and students.
- Workshop on IP management and licensing activities: A pre-conference workshop was held on February 2, 2012 (preceding the international conference on Management of Intellectual Property and Strategy organised by the SJM School of Management). The objective was to share with academic institutions and other organisations the experience and best practices on IPR management during the last decade. Fifty participants from national and international organisations attended the workshop. Presentations were made on IP policy, IP protection and IP licensing. This was followed by an open-house discussion on "Conflict of Interest in Academia vs Industries", on issues related to ownership, inventorship, publications, legal aspects, cost of IPR filing and maintenance, evaluation of IP and commercialisation.
- Innovation day workshop: A one-day brainstorming workshop was organised by MHRD, UGC and IITB for the Vice-Chancellors and Directors of Central and State Universities/IISERs on March 1, 2012, to share experiences and deliberate details on specific steps to foster and promote innovations at these entities. Forty-four representatives participated and the Secretary, MHRD, presided over the workshop. A road map was drawn up at this workshop which includes proposals from universities on schemes for internal and external innovation with specific timelines and expected outcome; national schemes on mobility grants; information exchange; high-end equipment usage; workshops; innovation advisory committees in universities with industry and society leaders as members; simple IP policy with incentives

to researchers technology commercialisation; decentralisation of internal systems and R&D administration.

f. Safety activities at the institute

A focused emphasis was made to have processes and procedures to address safety during R&D activities. Appropriate manpower was recruited to have institute-wide safety policies and audits. Some of the activities done during the year are:

- Preparation of institute occupational health and safety policy and manual
- Preparation of institute safety procedures
- Safety review and report of five academic entities
- Lab safety manuals on chemical safety and radiation safety
- Training modules on six topics (gas cylinder safety, radiation safety, biosafety, machine safety, fire safety and cryogenics safety)
- Procurement of safety videos for training/awareness
- Communication of accidents through safety alert
- Dedicated web page on Safety is being constructed

g. Online processes

Complete annual project information for all departments was made on-line during the year. This includes details of closed and running projects, sanctioned outlay of sponsored projects, grants received for consultancy projects during a financial year and the number of faculty members involved. A web-based interface was provided for students to submit details of the abstracts of their thesis work. On-line approval process and the facility to submit invention disclosures – resulting from such work – for possible patent filing were made available. New on-line modules for IP protection related to copyrights, designs and trademarks were created and various existing processes and modules were continuously updated.

h. Manpower development

To enable efficient handling of all new initiatives, manpower was increased in the technical, administrative and accounts sections. Training programmes in the areas of business communication, soft skills and office procedures were also conducted.

Outreach Programmes

Outreach programmes, viz., CEP (Continuing Education Programme), QIP (Quality Improvement Programme) and CDP (Curriculum Development Programme) continued to attract wide interest from industry, academia and from our own faculty.

The CEP courses at IIT Bombay are aimed primarily at working professionals, though in the last few years students have also been considered for specialised training programme under CEP. The QIP courses, on the other hand, are generally meant for teachers working in various degree-level engineering colleges to upgrade their expertise and capabilities. These courses are very popular and draw a large number of deputations from across the country. In order to provide college teachers an opportunity to interact with the industry professionals, special efforts were made to permit a few industry participants as part of the QIP courses, in the normal CEP mode. This model has been appreciated by the industry personnel as well as the teachers, and it has also helped improve the overall effectiveness of the various QIP courses.

Many of the CEP courses are now well established worldwide and continue to attract large participation, both from within and out side the country. The certificate course on "Piping Engineering" has reached another milestone and has crossed its 60th edition in 2011. Similarly, the courses on "Urban Drainage Management", "Casting, Design and Simulation", "Human Computer Interaction", "Energy Management", "Technology Innovation using Triz", "Elements of Chemical Engineering", etc., have all been well received by the industry. The certificate course in "Management with Dual Specialization in Marketing and Managing People" has now become a regular feature of the CEP calendar of activities. It received a significantly larger participation this year. Two editions of another newly developed course have been conducted for mathematics teachers at secondary school level. The course on "The Role of Technology in Crime and Crime Prevention", now in its 9th edition, has also established itself as an important training programme for IPS officers from across the country. This year, 15 very senior police personnel stayed at our campus for a week and participated in the course. This course provided an excellent opportunity for them to learn the various technological issues that are central to detection and prevention of crime.

As part of new initiatives during 2011-12, the third edition of a long-term certificate programme on "General Management for Technical Professionals" was conducted in distance mode using the facilities of a partner industry. The course was broadcast live from their studio in Mumbai and was simultaneously available at their centres in India and abroad. A total of 67 participants benefited from this course. The fourth edition, started in January 2012, had 61 participants registered for the course. Similarly, the on-line version of the course on "Piping Engineering" commenced in July 2009 has continued during the current year. Till now, about 120 participants from over 20 countries have registered, and the number is expected to increase because of the vast reach of the course. Currently, efforts are underway to include many other CEP courses in this initiative.

The overall performance of CE&QIP during 2011-12 was very good. A total of 125 CEP courses were conducted with about 3000 participants – from across different disciplines as well as industries, organisations

and institutions – and with a revenue earnings of around Rs. 5.35 crores. Under QIP category, five M.Tech. and 12 Ph.D. students from AICTE-approved engineering colleges were admitted. In addition, eight teachers were inducted into Ph.D. programme under "Advance Admission Scheme"; they will be joining the institute for the regular programme in July 2012. Further, 10 short-term courses were conducted for college teachers – under sponsorship from AICTE – with a total of 257 teachers participating in them.

Under CDP, two books were completed and one new book-writing proposal sanctioned during the year.

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 number of bright and young researchers from all over the world to join IIT Bombay as full-time or visiting faculty members. Further, a good 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 globalisation efforts in major universities in the world, we see a huge potential to engage in collaborative research with various partner universities. Many 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. Governmental and ministerial delegations from various countries in African, European, Asian, North American, and South American continents also visited IIT Bombay, and they have appreciated the value creation by IIT Bombay during its fifty-three years of existence.

MoUs with Foreign Universities

The institute signed memoranda of understanding with the following foreign universities:

- Technion – Israel Institute of Technology, Israel
- Supplemental MoU with GlobalTechAlliance (Group comprises of : 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)
- Hitotsubashi University, Japan
- Renewal of the MoU with Ontario Universities International (comprising the following: Carleton University, McMaster University, Queens University, Toronto University, Waterloo University, Western Ontario University, and York University)
- Renewal of the MoU with Technische Universitaet Darmstadt, Germany
- Ecole Centrale Paris, France
- Chalmers tekniska hogskola AB, Sweden
- IPD deed between Monash University, IIT Bombay and IITB-Monash Research Academy
- The University of Maryland, USA
- Ecole de technologie superieure, Canada
- Joseph Fourier University, France
- Carleton University, Canada
- Osaka University, Japan
- Nanosystem Research Institute, National Institute of Advanced Industrial Science & Technology, Japan

Memoranda of understanding were also signed with the following institutions:

- Dr. B.R. Ambedkar Institute of Technology, Port Blair
- Tata Institute of Social Sciences, Mumbai
- French Language Tutor Programme Agreement (for the Academic year 2012-13) with Embassy of France, New Delhi

Visits of International Delegations

IIT Bombay witnessed a fairly large number of international delegations for exploring areas of collaboration and cooperation. The major ones are listed below:

- A Japanese delegation led by Mr. Akitaka Saiki (Ambassador of Japan to India)
- EDB Singapore
- University of South Africa
- Northeastern University (USA)
- Nanyang Technological University(Singapore)
- National University of Singapore
- INRIA (France)
- Telecom SudParis, Ecole des Mines de Nantes & Ecole des Mines d'albi-Carmaux (France)
- The University of British Columbia (Canada)
- Royal Institute of Technology- KTH (Sweden)
- Malardalen University (Sweden)
- University of Maryland (USA)
- Ecole Centrale Paris (France)
- Rutgers University (USA)
- Carleton University (Canada)
- A Brazilian delegation led by Councilor Almerinda Carvalho (Head of the Division of Education Cooperation of the Ministry of External Relations of Brazil)
- Representatives from the British Council West India, Consulate of France (Mumbai), Consulate of Japan (Mumbai), DAAD (Delhi), DFG India, New Zealand High Commission
- Representatives from the World Bank
- Members of the French Parliament

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

International Students

A total of 52 international students (from countries such as Belgium, Canada, Czech Republic, Ethiopia, France, Germany, Iran, Italy, Nepal, Pakistan, Singapore, Spain, UK, USA) registered at IIT Bombay during the year 2011-12. They have joined the institute for course work/project work/postgraduate studies.

Student Exchange Programme

Under the memoranda of understanding, IIT Bombay students participated in the student exchange programme during the academic year 2011-12, as follows:

Autumn Semester :

TU Munchen, Germany	Two M.Mgmt. students from SJMSOM and one M.Tech. student from Electrical Engg
Carleton Univ., Canada	Three M.Mgmt. students from SJMSOM
FAU Erlangen, Germany	One M.Phil. student from Humanities & Social Sciences
Rice University, USA	One Dual Degree student from Electrical Engg.
National Univ. of Singpore	Three Dual Degree students from Electrical Engg.
Nanyang Technological Univ., Singapore	One B.Tech. student from Aerospace Engg. & one M.Mgmt. student from SJMSOM
Tohoku Univ., Japan	One M.Phil. student from Humanities & Social Sciences

Spring Semester :

National Univ. of Singpore	One B.Tech. student from Electrical Engg. & one Dual Degree student from Mechanical Engg.
Northeastern Univ., USA	One Dual Degree student from Mechanical Engg.
Nanyang Technological Univ., Singapore	Three Dual Degree students from Aerospace Engg., Two Dual Degree students and one B.Tech. student from Mechanical Engg., and one B.Tech. student from Computer Sci. & Engg.
Rice University, USA	One Dual Degree student from Electrical Engg. & one B.Tech. student from Computer Sci. & Engg.
Johns Hopkins Univ., USA	One Dual Degree student each from Civil Engg.& Mechanical Engg.

Foreign Language Courses:

IIT Bombay makes efforts to inculcate a global sense of value and culture among its students. French, Japanese, German, and Chinese language courses were organised in the cultural scheme by the native speakers of these languages. They are listed below:

- French (in association with the Embassy of France, New Delhi)
- Japanese (in association with Koo International Co. Ltd., Japan)
- German (in association with DAAD, New Delhi)
- Chinese (in association with Beijing Jiaotong University, China)

IDEAS Project under the Erasmus Mundus Programme:

IIT Bombay has secured funding for the Innovation and Design for Euro-Asian Scholars (IDEAS) project under the Erasmus Mundus Programme. Through a

scholarship scheme, IDEAS will facilitate the mobility of students doing undergraduate, master's, doctoral and post-doctoral programmes and of university staff in the academic or administrative positions. The Maelardalen University, Sweden – IIT Bombay's partner – is the lead university. There are also other European and Asian universities partnering in this project.

IDEAS scholarships are aimed at three so-called target groups in a specific geographical region in Asia called, "Lot 12". Under the first call of applications made in October 2011, scholarships were announced for the following types of mobility:

Target I Group: Doctoral: 1, Staff: 1

Target II Group: Doctoral: 3

Under the second call of applications made in February 2012, scholarships were announced for the following types of mobility:

Target I Group:	Master's: 2, Doctorate: 1, Staff: 3
Target II Group:	Master's: 3
Target III Group:	Master's: 1

Exchange of students under IITs-ParisTech Internship Programme:

The seven older IITs had entered into an MoU with the ParisTech group of institutions in December 2010. It was proposed to have an internship programme under this MoU, which would allow advanced undergraduate and postgraduate students to complete a 3-6 month internship at any one of the partner institutions. Infosys and EADs had committed funds under this programme, and IIT Bombay has already received the pledged amount of 100000 Euros from Infosys.

The statistics of internships announced under the various calls are as follows:

2011:

First call:

From ParisTech : 1 student (Master's)

From IITs : 9 students (Undergraduate)

Second call:

From ParisTech : 1 student (Ph.D.)

From IITs : 3 students (Ph.D.)

2012:

Third call:

From ParisTech : 1 student (Master's)

From IITs : 22 students (Undergraduate :16, Master's: 2, and Ph.D.: 4)

Global Tech Alliance Workshop

As a partner institute in the GlobalTech Alliance consortium, IIT Bombay hosted the 3rd GlobalTech Workshop on Energy Research for Global Sustainability during December 7-8, 2011. The workshop had representatives from Nanyang Technological University (Singapore), Imperial College (UK), EPFL Lausanne & ETH Zurich (Switzerland), California Institute of Technology (USA), and Georgia Tech (USA). Talks were given by top researchers from the partner institutions of the consortium, and poster presentations were given by IIT Bombay students. The workshop was organized by the Department of Energy Science and Engineering in coordination with the Dean (IR) Office.

Campus at New York

At the invitation of the New York City Economic Development Corporation, IIT Bombay had submitted an initial proposal for setting up a campus at New York, USA. The institute is among the 18 respondents shortlisted for the second round of bidding. In view of the complexity of operating from a distance, IIT Bombay joined a consortium called, "Centre for Urban Science and Progress" (CUSP), led by New York University. The other members in the consortium are: City University of New York, Carnegie Mellon University, University of Toronto, and University of Warwick. CUSP has the support of major utilities (ports, transport, etc.) in New York. Additionally, several well-known companies, such as IBM and CISCO, are supporting CUSP with financial commitments. IIT Bombay's commitments are primarily academic. CUSP has been announced as the second winner of the NYCEDC competition. The consortium will be established in Brooklyn and is expected to commence its academic programmes from 2014.

Alumni & Corporate Relations

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 financial resources for continued modernisation of facilities and removal of obsolescence. The government of India, through MHRD, continued to be the primary source of funds for the institute. The alumni and corporate donations, that have picked up significantly in the last few years, also provide a great support to the institute.

The Dean(ACR) office acts as an interface between major corporate donors, alumni network and IIT Bombay administration. The role of this office is to source and encourage more pledge through alumni network and to ensure growth in campus. Apart from brand-building and other promotional activities, they also organise various alumni events, establish long-term relationship and establish proper communication

to keep concerned corporate and individual donors updated on the progress of respective projects and the utilisation of funds. We have received generous contributions of over Rs.11 crores this year. The major ones are as follows:

Major Contributions - 2011-2012		
Source	**Sum (in Rs.)**	
AMAT (Applied Materials, Inc.)	2.32 C	23299255
Tuition Fees from Bharat Forge Ltd.	1.32 C	13200000
Wadhwani Electronics Lab (Alumnus Mr. Romesh Wadhwani)	1.93 C	10093320
Maharashtra Pollution Control Board Fellowship	1.00 C	10000000
Syntel Gymnasium (Alumnus Mr. Bharat Desai)	83. 41 L	8341233
KReSIT – Kanwal Rekhi School of Information & Technology (Alumnus Mr. Kanwal Rekhi)	53.36 L	5336073
YFA – Young Faculty Award - (Class of '80)	48.91 L	4891092
Class of '86 Legacy Project	42.95 L	4295000
Class of '82 Legacy Project	40. 02 L	4016149
Shailesh J Mehta School of Management (Alumnus Mr. Shailesh J Mehta)	38.95 L	3895983
Student Exchange Program (IITB - Paris Tech. Insti.)	32.50 L	3250000
Civil Engg. Chair Professorship – (Prof. Tarun Kant)	25.63 L	2589700
IITBHF – IIT Bombay Heritage Fund Scholarships	19.60 L	1960230
Boeing Scholarship	16.94 L	1694625
HATS (Hostel Alumni Team Stewardship)	12.75 L	1275791

*** Rs. C : Crore L : Lakhs**

Donations received through alumni and corporates and through other fund-raising drives are mostly utilised towards the following priority areas to enable the institute to pursue its goal of maintaining high standards in teaching and research.

Institute Development Fund : The Institute Development Fund mostly caters to the need of modernization and the establishment of new academic, research and campus infrastructure, etc.

Young Faculty Award (YFA): IIT Bombay is undergoing a rapid growth phase even as other institutions in India and abroad are also expanding. This creates significant challenge in attracting the best faculty to IIT Bombay. Operating solely through alumni contributions, YFA helps IIT Bombay to offer a competitive package to achieve better results in the recruitment of young faculty members. The YFA grants a sum of Rs. 1 lakh per year for four years to freshly recruited faculty members. This has proved to be a significant incentive to prospective faculty.

Chair Professorship: Chair Professorship is a distinguished academic position of the institute, and an academic honour to recognise the outstanding teaching/research work carried out by the faculty members of the institute. It can also be used to attract outstanding academicians to join the institute. Each Chair is supported by an endowment created from a donation to the institute.

Establishment of more and more Chair Professorships is essential for IIT Bombay to attract and retain high quality research faculty, a key element that is required to fulfill the goal of the institute to be a leading international research university. Chairs can also lead to establishment of new areas of specialisation through recruitment of accomplished researchers in specific fields of study. The endowment for a Chair is currently Rs. 60 lakh. At present, more than 50 faculty members have been endowed with Chair Professorship.

Hostel Development: Hostel Alumni Team Stewardship (HATS) is an important alumni-driven initiative that aims to channel the affinity and affection that many alumni have for their hostels. HATS is another activity run exclusively through alumni support and contributions. It focuses on the following key goals: (i) improve hostel infrastructure and facilities; (ii) assist mess workers; (iii) increase interaction between alumni and students; (iv) empower students to improve their living conditions under the aegis of "Make Hostel My Home" (MHMH); and (v) organise hostel-level reunions in each hostel on the Alumni Day.

Student Development: Government scholarships are provided to several meritorious students with economic

constraints. However, the number of students requiring financial assistance is far in excess of the available funds. Considering the need to financially support these students, a large number of additional students are awarded scholarships from donor contributions. In order to nurture and recognise academic excellence, several awards have been instituted by various donors. These awards cover students from all academic disciplines and programmes, and are given to several students every year.

Faculty Affairs

During the period, 19 faculty members on regular basis and 14 on contract basis were appointed. The number of full-time faculty members on the roll of the institute has risen to 517 comprising 243 Professors, 121 Associate Professors, and 133 Assistant Professors. In addition, there are 40 adjunct faculty members on the roll. Five faculty members retired (of whom two were re-employed) and three resigned during the year.

The institute provided financial assistance to 130 faculty members for participating in international conferences. In addition, 95 faculty members travelled abroad for attending international conferences using external funding and seven faculty members went abroad on Fellowships for research work.

Apart from educational and research pursuits, the faculty of the institute meet national and global obligations in diverse ways. Many of them have accepted membership of various national committees and editorship of journals. They also review manuscripts for publications. We are proud that their efforts have received recognition in the form of many awards and distinctions, some of which are listed below:

Prof Amit Agarwal, Department of Mechanical Engineering, has been elected as members of NASI, Allahabad.

Prof. Rinti Banerjee, Department of Biosciences and Bioengineering, has been awarded a Grand Challenges Explorations Grant from the Gates Foundation, based on an open global innovation challenge for global health research.

Prof. Pushpak Bhattacharyya, Department of Computer Science & Engineering, has been bestowed a "$10000 Yahoo! Faculty Research and Engagement Award" for a proposal he sent in the area of machine translation. The award is in the form of an 'Unrestricted Gift'

Prof. Soumen Chakrabarti, Department of Computer Science and Engineering, and his students have selected as a co-winner of the "ICDE 2012 Influential Paper Award" for their paper titled "Keyword Searching and Browsing in Databases using BANKS".

Prof. Subhasis Chaudhuri, Department of Electrical Engineering, has been selected for the prestigious "G.D. Birla Award for Scientific Research" in recognition of his important contributions in the area of Electronic Communications.

Prof. Subhasis Chaudhuri, Department of Electrical Engineering, has been elected as a Fellow of the Indian National Science Academy (INSA).

Prof. Dibyendu Das, Department of Physics, has been conferred the "APS-IUSSTF Professorship Award", instituted by the Indo-U.S. Science and Technology Forum (IUSSTF) and the American Physical Society (APS) .

Prof. T.I. Eldho, Department of Civil Engineering, and his research scholar Mrs. Meenal Mategaonkar have received the "Jalvigyan Purskar" for the year 2011 from the Indian Society of Hydraulics (ISH) for their paper "Meshless Point Collocation Method for 1D and 2D Ground Water Flow Simulation", published in the ISH journal of Hydraulics Engineering in March 2011.

Prof. Vikram Gadre, Department of Electrical Engineering, has been awarded the "SSI Varshney Award" in December 2011 by the Systems Society of India (SSI).

Prof. Subimal Ghosh, Department of Civil Engineering, has been awarded the "INSA Young Scientist Award 2012" in Engineering and Technology.

Prof. Subimal Ghosh, Department of Civil Engineering, has been selected for the "INAE Young Engineer Award 2011". The award was presented on December 23, 2011, during the Academy Annual Convention held at Hyderabad.

Prof. Haripriya Gundimeda, Department of Humanities and Social Sciences, has been made a member of a high level expert committee set up by the Government of India to prepare the road map for developing Green National Accounting for India. This is a recognition of her work in carrying out green accounting for select sectors in India.

Prof. Krishna Jonnalagadda, Department of Mechanical Engineering, has been awarded the "Hetenyl Award" for the best research paper – "Experimental Investigation of Strain Rate Dependence of Nanocrystalline Pt Films" – in Experimental Mechanics.

Prof. Jothiprakash, Department of Civil Engineering, has been awarded the "Surendranath Mukherjee Memorial Prize" for best research paper in Civil Engineering Journal of Institution of Engineers (India).

Prof. Jothiprakash, Department of Civil Engineering, has been awarded the "ISTE Maharashtra State National Award for Outstanding Research Work in Engineering and Technology for the Year 2011(Shared)".

Prof. Tarun Kant, Institute Chair Professor, Department of Civil Engineering, has been elected as a Fellow of the National Academy of Sciences India (NASI).

Prof. Azizuddin Khan, Department of Humanities and Social Sciences, has been awarded "ICMR International Fellowship for Young Bio-Medical Scientist" for the year 2011-12.

Prof. Vinish Kathuria, SJM School of Management, has been selected for the "P.C. Mahalanobis Award". This is a biennial award given by the Indian Econometric Society (TIES) and was presented during the 48th Annual Conference of the Society, held at Pondicherry University, Pondicherry (1st to 3rd March, 2012).

Prof. Nand Kishore, Department of Chemistry, has been inducted to the Editorial Advisory Board of "Journal of Chemical Thermodynamics".

Prof. S.V. Kulkarni, Department of Electrical Engineering, has been elected as a Fellow of the Indian National Academy of Engineering (INAE)

Prof. Sudarshan Kumar, Department of Aerospace Engineering, has been selected for the "INAE Young Engineer Award 2011".

Prof. Anurag Mehra, Department of Chemical Engineering, has been elected as a Fellow of the National Academy of Sciences India (NASI).

Prof. Asmita Mukherjee, Department of Physics, has been awarded the Humboldt Fellowship for Experienced Researchers by the Alexander von Humboldt Foundation

Prof. A.K. Pani, Department of Mathematics, has been elected as a Fellow of the Indian Academy of Sciences.

Prof. Siva Prasad, Department of Physics, has been selected for the award of "Chevalier de l'Ordre de la Legion d'Honneur" (Knight in the Order of the Legion of Honour) by the French Government in recognition of his scientific achievements and contributions to enhancing scientific co-operation between France and India.

Prof. C.P. Rao, Department of Chemistry, has been elected as a Fellow of the National Academy of Sciences India (NASI) in recognition of his outstanding contributions to research in Chemistry.

Prof. C. P. Rao, Department of Chemistry, has been elected as a Fellow of the Indian Academy of Sciences.

Prof. M. Ravikanth, Department of Chemistry, has been chosen to receive the "CRSI Bronze Medal" in recognition of his contributions to research in chemistry

Prof. Nina Sabnani, Industrial Design Centre. His documentary film "The Stitches Speak" won the 6th award at CINEQUEST Film Festival, San Hose, USA, for the best short documentary.

Prof. Hetu Sheth, Department of Earth Sciences, was selected for the "National Geoscience Award 2010", in Basic Geosciences, by the Ministry of Mines, Govt. of India. The award was given away at a function in Vigyan Bhavan, New Delhi, on February 16, 2012.

Prof. R.K. Shevgaonkar, Department of Electrical Engineering (currently on lien as Director, IIT Delhi), has received Fellowship of IEEE.

Prof. D.N. Singh, Department of Civil Engineering, has been bestowed the "John R. Booker Excellence Award 2011" in recognition of his contributions to the advancement of research, education and practice of environment geotechnology and development of novel techniques to simulate contaminant transport in geomaterial under laboratory and in situ conditions.

Prof. D.N. Singh, Department of Civil Engineering, has been elected as a Fellow of the American Society of Civil Engineers.

Prof. H.B. Singh, Department of Chemistry, has been elected as a Fellow of the Indian National Science Academy (INSA).

Prof. H.B. Singh, Department of Chemistry, has been chosen to receive the "CRSI Silver Medal" in recognition of his outstanding contributions to research in Chemistry.

Prof Chetan Singh Solanki, Department of Energy Science and Engineering, has received the first prize (Rs. 50000 and a certificate) from the Ministry of New and Renewable Energy (MNRE), Government of India, for his book on renewable energy in Hindi. The book Akhshay Urja Prodhyogiki - Ek Vyavaharic Gyan, published by Prentice Hall of India.

Prof. Rohit Srivastava, Department of Biosciences and Bioengineering, has been elected as members of NASI, Allahabad.

Prof. Anshuman Shukla, Department of Electrical Engineering, has been selected for the "IEI Young Engineers Award 2011-12" in the Electrical Engineering discipline.

Prof. S. Sudarshan, Department of Computer Science and Engineering, and his students have selected as a co-winner of the "ICDE 2012 Influential Paper Award" for their paper titled "Keyword Searching and Browsing in Databases using BANKS".

Prof. Mahesh Tirumakudulu, Department of Chemical Engineering, has received the prestigeous "Swaranjayanti Fellowship Award" of the DST, for the year 2010-11.

Infrastructure Development

This year we undertook two major building projects, namely, up-gradation of Convocation Hall and Transit Workshop building. The infrastructure projects that were completed during the year include Nano Electronic Centre, Bio-School building (with 3 teaching labs, 28 faculty labs, classrooms and department office), and C-Type faculty housing building (56 flats). The projects

such as Extension to Hospital building, Type -B faculty housing (120 flats), additional two Type II-B buildings (56 flats), QIP/DRDO housing (80 flats), and Transit Workshop building are nearing completion. The construction work of Hostels 15 & 16 (2000-student capacity) and Computer Science & Engineering Department and Computer Centre building is in full swing and these buildings will be fully ready by June 2013.

Many other projects such as Hostel 10 Extension (750 rooms), Guest House expansion with 100 additional rooms, IITB-Monash Research Academy, H-1 Type staff housing buildings (60 flats), and a building for the Department of Energy Science & Engineering and the Centre for Environmental Science and Engineering are at various stages of planning and pre-execution. The new projects are being designed and built on GRIHA-4 standards.

The building projects that are planned to be taken up in the near future include Rahul Bajaj Technology Innovation Centre building for Society for Innovation and Entrepreneurship, Industrial Research and Consultancy Centre, National Centre for Mathematics, Hostel 17 (1000-capacity), and Married Student's hostel (400 capacity).

Central Library

Central Library is a true reflection of IIT Bombay's "Culture of Excellence" and a great knowledge resource in the world of scholarship. Housed in an independent five-storied building, it holds one of the best collections – both in print and electronic form – in engineering, sciences, technology, arts & humanities, and social sciences. Considered best in the region, the Central Library is valued by its users (over 10,000) not just for the facilities it provides – or for the strength of deep, relevant collections it has – but for the ways in which it understands their needs and supports their forward-looking academic and research mission through user-focused services. Some of the important activities undertaken during the year are listed below :

- The library added over 7000 volumes of latest books and journals to its collection. It undertook a massive reorganization of its collection, and over 50000 volumes of old and not-so-used books and bound journals were shifted to newly installed movable stacks for compact storage in the basement of the building. A system has been put in place for quick recall of such documents including an annotation in the library catalogue (OPAC) for all books. This exercise has helped create space for new additions. A book exhibition was organised during January 2012 to facilitate students, faculty and staff to browse and select latest publications in their subjects. The library also organised an exhibition-cum-display of Hindi books during the "Hindi Pakhwada" celebrated by the institute.
- Library homepage continues to provide access to all its resources, including web-based access to over 12,000 electronic books, journals and databases. The OPAC (library catalogue) is one of the most heavily used databases of the library and is accessible 24x7 via library homepage. Besides listing all the documents available in the library, it allows on-line renewal and reservation, circulation, fine collection, and indicates status of a particular book. OPAC can be searched by author, title, accession number, subject and several other fields.
- The institutional repository now contains over 13500 publications brought out by the IIT Bombay community. The library has also created a blog to post current and interesting information regarding our resources, services and news items from IIT Bombay and other institutes. It also offers a platform to interact with the users, for their comments and feedback.
- The library continues to offer services like reference and consultation, document delivery, arranging material from other libraries through interlibrary loan, helping students belonging to weaker sections of the society to borrow textbooks from the book bank, organising user education programmes to enhance awareness about various resources and services of the library. It also offers services to industry and corporates, IITB alumni and engineering educational institutions, and has earned over Rs. 35 lakhs for the services rendered.
- The library has galvanised itself to successfully engage its users in a multifaceted information environment in order to remain their valuable partner in education and research.

Computer Centre

Computer Centre continues to provide computational and network infrastructural facilities and services to the IIT Bombay user community. It is responsible for the intra-campus connectivity and also for the Internet connectivity of IIT Bombay to the outside world. During the year, the following activities have been undertaken:

- The installation of network switches in the newly constructed residential buildings has been completed. The Internet facility is now available to each resident on the campus.
- A few network kiosks have been newly built to host the networking equipment, which can be used as distribution points to the nearby residential buildings on the campus.
- The total Internet bandwidth for IIT Bombay campus users has been increased from 565 Mbps to 910 Mbps. Computer Centre is satisfied with the quality of service provided by the empanelled Internet service providers.

High Performance Computing Clusters: The old computing cluster CORONA continues to function as before. Given the space constraint, the cluster continues to be housed in the premises of the Chemistry department. The cluster "Spacetime Supercomputing" facility consisting of 380 nodes with as many as 3040 processing cores, built using the most recent Intel quad core processors, is operational at the ground floor of the Computer Science and Engineering department building. The aggregate theoretical speed is expected to be around 20 Tera-Flops. A course on High Performance Computing is being run on the "Spacetime" HPCC facility. The total number of research groups using the "Spacetime" facility is now 40.

Appropriate measures have been taken to reduce the noise generated by the chiller plant (of HPCC Facility) to the permissible levels. The installation of a Diesel Generator set for the "Spacetime" HPCC facility has been completed. It is expected that the DG-set will provide a better and smoother operation of the HPCC facility in terms of reducing the possibility of hardware failures.

National Knowledge Network (NKN): IIT Bombay continues to be a member of the National Knowledge Network. This multi-gigabit network initiative, started by the National Informatics Centre (NIC), is being used by CDEEP to conduct distance education programmes. Two staff members from the Computer Centre represented IIT Bombay in the the National Level meet of the partners of the NKN initiative, organised by CDAC. This enabled IIT Bombay to improve and enhance the technologies for fruitful use of the infrastructure under NKN.

Grid Computing Facility – GARUDA: This facility, supported by the Computer Centre, allows the users of the institute to access the available resources on the National Grid.

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 System 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 meant for scientific and technical computation such as ANSYS, MATLAB, MATHEMATICA, MAPLE, Dytran / NasTran / Partan, Tecplot, libraries from Numerical Algorithm Groups (NAG), etc., that are available through appropriate licence schemes, are procured, upgraded and administered by the Computer Centre as per the requirements of the student, faculty, scientists and staff.

Around 32 new faculty joined the institute during the year. They have been provided with a desktop computer/Laptop, printer and additional computer hardware.

The Computer Centre encourages and has implemented the use of Open Source software systems for office automation in about 765 PCs deployed in the various administrative sections of the institute. The centre continues to play a secondary role by providing technical support to run the IP-based Security Surveillance systems for the Security section. The computer network set up by the centre enables the Electric Maintenance division to monitor the power distribution systems, check the status and operation of various lifts functioning in the buildings and also the functioning of UPS Systems. The Telephone Exchange runs a few IP telephones (Voice over IP) using the computer network of the institute. IIT Hospital displays the schedules of the availability of doctors on the Web site of the hospital and this information is accessible over the IITB LAN.

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 15 years. The cable network, as it exists now, is rather ad hoc and has seen patched many times because of damages, mostly during construction and the repair of roads. 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 for 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. The networking of the upcoming institute classroom complex is being undertaken.

Sine

The Society for Innovation & Entrepreneurship (SINE) manages a technology business incubator at IIT Bombay. In the year 2011-12, SINE hosted 14 companies, and three companies graduated from the incubator. Of its current and graduated companies, three companies received investments from Angel Investors and Venture Capital firms. The current companies are in the areas of software for education, audio technology, security devices using nano technology, engineering software, geometric simulation software for foundries, and mechatronics. So far, 45 companies have been incubated. SINE is operationally self-sufficient.

Centre for Distance Engineering Education Programme

CDEEP continued its main activity of recording new courses and transmitting them to the participating remote centres. IIT Bombay got its policy guidelines on distance education implemented during the year. The earlier courses recorded by CDEEP are being made available to individual users at nominal charges. Many students and faculty members across the country are making use of this facility. During two semesters in the past year, 21 regular courses covering 10 disciplines were recorded and transmitted. The technology upgradation is continually pursued in CDEEP. As a result, there is a significant leap in the quality of audio and video through technologies, namely, videoconferencing and web transmission. This was also possible because of the HD quality equipment that is used and a good network bandwidth (through NKN) that is available. Four studios of CDEEP are fully equipped and functional to do the transmission through videoconferencing and web in an interactive mode. CDEEP provided recorded courses to 64 persons at Rs.300 (copying charges) per course. It also made available 180 days of uninterrupted access through internet VOD to another 27 users at Rs.1000 per course. CDEEP recorded various events on campus including 49th Convocation, Foundation Day, institute colloquia and distinguished talks.

Head, CDEEP, attended an international convention on "Virtual Education: Issues, Challenges and Perspectives" in New Delhi on February 24 and 25, 2012. Leading educators from several countries attended the convention. One of the main themes in the convention was how to make distance education effective. A virtual panel discussion on "Frontiers in Chemistry" was arranged on December 19, 2011, jointly by CDEEP and the Department of Chemistry. Fifteen institutions, including IITs, IISc, NCBS and universities, participated in the discussion and over 200 people attended the event.

During the year, several films of academic and research relevance were recorded by CDEEP. Notable among them are films on "High Performance Computing Facility" at IIT Bombay, "Transportation Engineering" (for WCTR 2016), "Research Activities of Research Scholars", and "Radiation Effects due to the Use of Mobile Phones".

CDEEP's support to NPTEL-II, MHRD-I and MHRD-II projects continued through the year by providing studio facilities and professional expertise. Twenty-five video courses have been recorded for the NPTEL-II project. There are 13 research scholars working in the interdisciplinary programme in Educational Technology, and CDEEP continues to support the activities of this programme.

Institute Events

The 49th Convocation of the Indian Institute of Technology Bombay was held in two sessions. At Session-I, held on August 5, 2011, Dr. M.S. Valiathan, National Research Professor, was the Chief Guest and delivered the Convocation Address. Mr. M.V. Kamath, non-Executive Chairman, Board of Directors, ICICI Bank Limited, was the Chief Guest at Session-II, held on August 7, 2011, and delivered the Convocation Address.

IIT Bombay celebrated its **53rd Foundation Day** on March 9, 2012. Prof. M.M. Sharma, Chairman, Board of Governors, IIT Madras, was the Chief Guest. The institute honoured nine of its alumni with the Distinguished Alumnus Award-2012 and one with the Young Alum Achiever Award-2012. The **"Prof. H.H. Mathur Award for Excellence in Research in Applied Sciences, 2010"** was conferred on **Prof. K. V. Venkatesh,** Department Chemical Engineering, and the **"Prof. S. C. Bhattacharya Award for Excellence in Research in Pure Sciences"** was conferred on **Prof. R. Murugavel,** Department of Chemistry. IIT Bombay also presented the **"Lifetime Achievement Award-2012"** to **Prof. A.W. Date,** Department of Mechanical Engineering, and to **Prof. Tarun Kant,** Department of Civil Engineering, in recognition of their outstanding contributions as teachers, researchers and administrators.

"Teacher's Day"

The 53rd "Teacher's Day" was celebrated on Monday, September 5, 2011. Dr. Kirit Parikh, Chairman, Integrated Research and Action for Development, was the Chief Guest. The "Excellence in Teaching Award-2011", the "IRCC Research & Industrial Consultancy Award (2009-10)", and the "Dr. P. K. Patwardhan Technology Development Award" were presented on the occasion.

"Vanamahotsav 2011" was celebrated on August 9, 2011. Saplings were planted at Powai Vatika near Devi Temple and along the lake fringe road of the campus.

Centre for Cancer-Related Research

A new centre for cancer-related research called, "The Wadhwani Research Centre in Biosciences and Bioengineering' was opened at the Indian Institute of Technology Bombay (IITB) during the year. The centre, created through a 2008 Memorandum of Understanding (MoU) between IITB and Wadhwani Foundation, will mainly focus on understanding cell mobility and migration.

Conferences/Colloquia/Lectures/Seminars

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

- Prof. M. S. Narasimhan, (FRS, King Faisal Prize), Tata Institute of Fundamental Research, Bangalore, spoke on "What Does Mathematics Do, and How?" at an institute colloquium on March 28, 2011.

- Prof. K. S. Gandhi, Department of Chemical Engineering, Indian Institute of Science, Bangalore, spoke on "Hopes & Fears for IITs: A View from the Sidelines" at an institute distinguished lecture in Chemical Engineering (in memory of Professor K.C. Khilar) on April 6, 2011.
- Prof. P. N. Bartlett, Professor of Electrochemistry, School of Chemistry, University of Southampton, UK, spoke on "SERS on Nanostructured Surfaces and Application to DNA Detection and Discrimination" at an institute lecture on May 20, 2011.
- Dr. Ravi Kannan, Principal Researcher, Algorithms Research Group, Microsoft Research Labs., India, spoke on "Vectors, Probability and Algorithms" at an institute colloquium on July 26, 2011.
- Prof. Raghuram Murtugudde, Department of Atmospheric and Oceanic Science, and Executive Director, Earth System, Science Interdisciplinary Center, University of Maryland, College Park (UMCP), USA, spoke on "Predictions to Solutions: Role of Technology in Facing Change" at an institute colloquium on August 3, 2011.
- Dr. Michael E. Peskin, Professor, Particle Physics and Astrophysics, SLAC National Accelerator Laboratory, Stanford University, USA, spoke on "The Search for New Elementary Particles at the CERN Large Hadron Collider" at an institute colloquium on August 29, 2011.
- Dr. Claude Alvares, Environmentalist, Goa, spoke on "Social Engineering and Livelihoods: Need for Creative Dialogues", an institute colloquium on September 6, 2011.
- Prof. Anthony K. Cheetham FRS, Department of Materials Science and Metallurgy, University of Cambridge, United Kingdom, spoke on "Recent Advances in Inorganic/Organic Framework Materials" at an institute colloquium on September 29, 2011.
- Vice-Admiral Pradeep Chauhan AVSM, VSM, Chief of Staff, Western Naval Command, Indian Navy, spoke on "India's Maritime Security and the Navy's Transformational Role" at an institute lecture, on November 2, 2011.
- Prof. Murray Gray, Department of Chemical and Materials Engineering, University of Alberta, spoke on "Development and Management of New Energy Supplies: Canada's Experience with Unconventional Energy Development" at an institute colloquium on November 11, 2011.
- Dr. Venki Ramakrishnan (Nobel Prize winner in Chemistry–2009), Structural Studies Division, MRC Laboratory of Molecular Biology, Cambridge, England, spoke on "Unravelling the Structure of the Ribosome and its Role in Decoding the Genetic Message" at an institute colloquium on January 7, 2012.
- Dr. Jagdish (Jag) N. Sheth, Charles H. Kellstadt Professor of Marketing, Goizueta Business School, Emory University, spoke on "Impact of Emerging Markets on Future of Innovation" at an institute colloquium on January 17, 2012.
- Professor Andre Beteille, Professor Emeritus, University of Delhi, spoke on "The Institutions of Democracy" at an institute colloquium on February 9, 2012.

Staff Development

The Personnel Training and Development Cell organised 20 training programmes on the most preferred areas for the non-teaching (Groups A, B, C and D) staff members of the institute. In all, 525 staff members participated in these training programmes. Besides, 11 staff members were nominated for training at different organisations to acquire specialised job-related knowledge/skills.

Hindi Cell

The Hindi Cell provides support for effective implementation of Hindi in the institute. Circulars, registers, forms, visiting cards, signboards, notice boards, banners, posters and service books are prepared in bilingual form.

The Hindi Cell conducts workshops for staff members and encourages them to use Hindi in their routine work. The staff members were also provided in-house training in Hindi word processing. This year five staff members have passed Hindi typing examination, conducted by the Hindi Teaching Scheme, securing more than 90 per cent marks. A special workshop was arranged for the senior officers of the institute. Dr. Damodar Khadse, Member, Central Hindi Advisory Committee, delivered a lecture on the use of Hindi. A software programme has been developed for the benefit of students to enable them to write their names in Hindi. The degree certificates are issued at IIT Bombay in bilingual form.

The Hindi *Pakhawada* was celebrated in the month of September. The Central Library of the institute arranged a Hindi Book exhibition on its premises during the celebration. Booksellers participated in the book exhibition. An amount of Rs 57,836 was spent on purchase of Hindi books. Today, the Central Library is in possession of a vast collection of Hindi books. A Hindi *Kavi Sammelan* was organised on the occasion of Hindi *Pakhwada*. A Hindi essay competition also was arranged on the occasion by the students.

A policy of persuasion and encouragement has been adopted for the implementation of Hindi at the institute. This year 10 staff members were honoured for their significant contribution. We continue to provide

support to some government organisations such as Central Translation Bureau, K.V.IIT Powai, Nitie, and Mahanagar Telephone Nigam Ltd. in their training programmes for Hindi translation, noting and drafting.

Student Activites

Sports

During the year 2011-12, 542 students were enrolled for the Senate-mandated National Sports Organisation (NSO). Inter-hostel matches for different categories of games were held. There were in all 18 events. Hostel-10 won the General Championship for girls and Hostel-3 won the General Championship for boys. Hostels 2 and 4 were declared as the first and second runners-up, respectively, for the General Championship for boys.

IIT Bombay participated in the Inter-IIT Sports Meet held in December at IIT Kharagpur and stood second and third in the overall General Championship for boys and girls, respectively. It secured Gold Medal in Athletics (Boys), Waterpolo (Boys), and Badminton (Girls); Silver Medal in Badminton (Boys), Basketball (Boys), Table Tennis (Girls), Weightlifting (Boys), Aquatics (Boys), and Lawn Tennis (Girls); and Bronze Medal in Lawn Tennis (Boys), Table Tennis (Boys), and Athletics (Girls). IIT Bombay came in joint first, tied at first place with IIT Madras with 66 points in sports events. IIT Madras was declared the champions after inclusion of ancillary points; it exceeded IIT Bombay by 0.5 of a point.

Sports activities were conducted for postgraduate students throughout the year. These students participated enthusiastically in the sports events such as Aquatics, Badminton, Basketball, Football, Kho-Kho, Lawn Tennis, Squash, Table Tennis, Volleyball, and Cycling. To create sports awareness among students, the Student Gymkhana initiated steps to introduce Self-Defence classes in Judo and organised mixed sports tournaments of Tug-of-war, Cricket, Badminton and Basketball. The events witnessed participation in huge numbers, specially from the girls. New clubs for Rubik's Cube, Skating and Wildlife were set up and events held. The Institute Tennis Championship (league format) was also initiated. Freshmen weekend was conducted in two phases which ensured more matches for every hostel. Camps were held for basketball, hockey, lawn tennis and cricket. A Hockey exhibition match between Superleague Bombay Hockey Association teams was organized.

Cultural Activities

Regular cultural events such as workshops, competitions, courses on Photography and Fine Arts were organised for the benefit of interested students. The workshops included interactive sessions with the professional photographers and photowalks. 'Photographer of the Week' as a campaign and 'Vision' as a road-side exhibition were initiated. Workshops in Fine Arts were organised with the help of faculty from IDC. Professional 'Wall Painting' and 'Road Painting' was done at multiple venues on the campus.

A broadcasting channel named, “IIT Bombay's Broadcasting Channel” (IITBBC) has been initiated to create awareness about the activities held in the institute. Professionals like Anurag Kashyap, Bejoy Nambiar conducted workshops in order to give a taste of the genre to the beginners and teach improved techniques to the student film-makers. A film-room in SAC for use as an editing station with green screens and cameras has been envisaged. IIT Bombay secured the first position at the NFI International Film Making competition. It also won 15 intercollegiate film-making competitions across the country.

In the music band event at Chaos – an IIM-A festival – IIT Bombay stood first and at Malhar they ended up as finalists. In “String Theory” at Mood Indigo, IIT Bombay secured the first place.

IIT Bombay won the Overall Literary Arts Trophy at Malhar by securing first position in four competitions and second in two. The Literary Arts trophy at Mood Indigo was also lifted by it. IIT Bombay won the Sports Quiz and secured the fourth position in Nihilanth – an Inter-IIT IIM Quizfest. The Sweden India Nobel quiz was conducted on campus where IIT Bombay's team won the overall National Grand Finale and secured an 'All-Expenses Paid Trip' to Sweden. IITB's quizzing blog has been made a regular online activity accessible to student community more easily.

Annual Insync Dance Show was conducted, and over 10 performances and more than 14 dance forms were presented. IIT Bombay contingent secured the first or the second of all dance events in IIMA's cultural festival winning the overall trophy in the genre.

The third edition of IIT Bombay National Debate was held successfully, marking it as one of the premier debating events in India. Spandan, the book (Hindi) of IIT Bombay with collections of Hindi poems and articles, was released. Debating workshops were held during the week.

Hawalaat' – the winning entry of “Main Dram GC 2010-11” and of “Mood Indigo 2010” was performed at the National Centre for the Performing Arts. IIT Bombay's plays have also been performed at Prithvi Theater during the Yatri Theatre festival. IIT Bombay stood second in the Street Play as well as Stage Play in ICTs festival. Workshops and theatre festivals were conducted. Mandali – a Street Play club – has been founded this year to promote the street play culture in the institute.

For the first time, the elements of Folk Art were introduced in the institute by conducting a week-long 'Folk Classical Exhibition' in collaboration with SPICMACAY.

NSS Activities

NSS conducted a number of activities during the year. 'Green Campus' – a new group of NSS – started this year with an objective to make the campus cleaner and greener. Over 800 saplings of gulmohar, yellow drops, palas, jaamun, etc., were planted at the IITB Medicinal Plant nursery. RISE (Remedial Instruction for School Education) – a programme under 'Educational Outreach' – provides remedial teaching in basic Sciences, English and Mathematics to children studying in 6th-10th standards. NSS Sanganak Vidya Kendra (NSVK) is another effort to empower the underprivileged, through computer literacy. The volunteers also undertook activities such as collecting clothes within the campus and distributing them to the needy through NGOs, making scientific toys from trash materials and using them to teach children various scientific laws and their applications, and making posters to create awareness about reducing mess-food wastage and electricity consumption in the hostels. The Group for Rural Activities (GRA) organised field visits to rural areas to study the developmental activities that were being carried out by various organisations in the villages. They interacted with villagers, discussed about their problems, and helped them improve their technology by acquainting them to new and efficient ways of solving their problems. The students also did some kind of Shram-daan activity.

NCC

In all, 143 cadets from IIT Bombay enrolled for NCC. Six girls enrolled for the NCC Senior Wing. The unit held a 10-day annual training camp during which they organised a cultural programme. The cadets were given training in obstacle wire crossing and civil defence activities, and also in firefighting and first-aid relief in case of emergencies. NCC took part in the campaigns against "Abuse of Toboco" and "Drink-and-Drive".

Student Mentor Programme

The Institute Student Mentorship Programme is primarily meant to help freshmen with language issues and the students facing academic difficulties. The programme has initiated a 'freshmen' survey to take feedback on the mentorship programme. It has also developed a 'freshmen' booklet and formed a 'freshmen' forum to help new entrants to adjust to the institute environment. An on-line confidential counselling system interface has been designed and tested. It can become operational from the next academic year.

Mood Indigo 2011

"Wild West" was the theme chosen for this year's festival. Mood Indigo 2011 saw huge improvements in the quality of participants from Mumbai and outstation colleges, especially Delhi. Competitions were held in various genres of culture – Dance, Dramatics, Fine Arts, Music, Literary Arts and Speaking – all of which saw a rise in participation. "Choreo Night" – a group dance competition – final was showcased at the OAT for the first time. Aagaaz – a street play competition – was conducted in three cities.

For the first time in its journey of 41 years, Mood Indigo welcomed four international dance groups to participate in International Youth Folkdance Festival, Mood Indigo Worldfest 2011. A total of 86 people came from Poland, Indonesia, Spain and Turkey. Mood Indigo had participants from 142 international artists – the highest number ever at a college festival – and we have filed for "The Limca Record". The previous record was 53.

The 'Informals' department saw some major structural changes. This time around, the focus was to take more and more events to the crowd. The objective was to reduce classroom events. Street games and adventure sports were expanded to suit the forte. "Akcent" performed live for a crowd of 1200.

Mood Indigo's semi-pro rock band competition Livewire became the first college fest competition to be recognised at international level. A tie-up with Global Battle of Bands made Live-wire the Indian leg of the global competition held in over 30 countries.

"Sparsh", a programme for the underprivileged and orphan kids across Mumbai, was successfully conducted. Six workshops (Pottery, T-shirt Painting, Dance, Origami, Career Awareness, etc.) were held in three orphanages in Mumbai. A slum awareness drive involving 800 students and about 70 student volunteers – which included street plays, workshops and awareness sessions – was conducted at the Hanuman Nagar slum in Kandivali. As part of the "Live Your Dreams" campaign, 10 students were taught street dance and were given a chance to perform at Mood Indigo.

Techfest 2012

Techfest 2012, IIT Bombay's Annual International Science and Technology festival, celebrated its 15th anniversary this year. As part of the "Techfest 2012", competitions, lecture series, workshops, etc., were organised, as follows:

Competitions: Six hundred colleges from across the country participated in the competitions. A total of 22000 registrations were made on the website including 750 from the institute. A team from IIT Bombay won the "Canyon Cross", for building a meter-long Popsicle stick bridge that could withstand over 250 kilograms of load. Apart from the flagship events like Robowars and Full Throttle, competitions like Appsurd, Code 'em Poker, Magneto, Cricbot, Freighter 15 etc., were designed with the help of institute professors to cater to all genres of science and technology.

Lecture Series: Among the 14 eminent personalities who delivered talks at the festival were Nobel Laureate Sir Venkatraman Ramakrishnan; K Brandenburg, inventor of the MP3 technology; and Hakon Wium

Lie, Inventor of CSS and CTO of Opera. Non-conventional topics like Dreams, Hypnosis and Cryonics were covered by Dr. Deirdre Barrett, a Harvard Medical School Psychologist, and Aubrey De Grey who is on the scientific advisory board of Alcor Life Extension Foundation, the world leader in Cryonics. The first ever INK on Campus conference was also held with speakers like Shantanu Moitra, famous Music Composer, and Mahesh Samant, MD, Walt Disney India.

Technoholix: The vision was to broaden the range of genres and bring in new shows breaking the tradition of fire, laser shows and other conventional shows. "Real Time Light Graffiti", "Projection Mapping", "Trampoline Acrobatics", "Percussion", and "Afternights" were introduced for the first time. "Afternights" featured a bubble artist from Spain and a mentalist from Singapore.

Street Exhibitions: With an aim to keeping people engaged at all times and places, exhibits like the unique "Diwheel" and "Micycle" took to the streets. A customised bike exhibition and an RC plane air show were also organised to keep the onlookers on their toes.

TechConnect: "TechConnect" saw increased enthusiasm among all departments. Due to the overwhelming response, the hangar size was increased to 24mx24m as compared to the previous year's 21mx21m.

Ozone: A host of on-the-spot competitions were organised to ensure that everyone, and not just the tech-savvy visitors, had something or the other to be involved in. Workshops such as "Ninjitsu", "Lucid Dreaming", "Mentalism" and "Handwriting Analysis" were held free of cost for everyone who wanted to attend. "Lazertag", "Paintball", "Water Zorbing", "Mechanical Bull" and "Robotic Gaming Arena" were set up to keep everyone engaged. The Ozone stage and the popular gaming zone were also organized as a constant hub of fun activity. The street artist David Lai, a famous mentalist from Singapore, kept the people enchanted.

Workshops: A total of 10 workshops ranging from "Street Photography" and "Automotive Sketching" to "Self-balancing Robots" and "Image Processing" were organised to give students a hands-on experience of technology.

Ummeed-e-Milaap: Ummeed-e-Milaap was one of a kind initiative. The aim was to propagate a feeling of unity among SAARC countries by focusing on similarities across the borders and to use technology exchange as a first step in establishing a relationship between students from these countries. The colleges from SAARC nations which accepted this initiative were LUMS, Lahore, and FAST NUCES, Karachi. The initiative was two-phased. In the first phase, a Diary was circulated among about 30 colleges in Mumbai, Lahore and Karachi for students to put down their thoughts and ideas on promoting peace and understanding between the countries. The second phase consisted of competitions in LUMS, Lahore, and FAST NUCES, Karachi. The winning teams were invited to IIT Bombay on 5th February. Events such as a Student Conference, a Robotic Competition and a Panel Discussion were organised here to foster a better understanding of each other's cultures, traditions and lifestyle.

Techfest National Open Quiz(TNOQ): With the idea of creating the biggest college quiz contest, TNOQ prelims were held across seven centres in the country including some of the best institutions like IIMA, St. Stephen's College, ISB. The finals were held at IIT Bombay during Techfest with an open round for students who missed the city rounds. A prize money of Rs.1 lakh was awarded to the winners of the finals. A total of 1100 teams participated in the city rounds and 800 in the open round. IIT Bombay's team finished third.

E-cell

The Entrepreneurship Cell at IIT Bombay has been very active throughout the year. The major activities conducted are:

Eureka!: "Eureka! Social" was launched to develop specialised focus on social businesses. Tie-up was made with BASES, Stanford University, for direct entry of top teams from different tracks of Eureka! into a six-day boot-camp in Silicon Valley, California, and with multiple NGOs like United India, the Grameen Creative Lab offering incubation services to winners of "Eureka! Social". Tie-up was also made with Dell Social Innovation Competition, University of Texas, for special consideration of top-placed teams. Three teams made to final round.

E-Summit: Multiple workshops were organised by speakers both from within and outside India. In all, there were eight workshops. A Virtual Stock Market was organised on a national scale with significant changes to the code so as to closely simulate a real stock exchange. Student-focused events – such as Biz Quiz, Ignite, Ideastorm, Nokia Adventures, Business Simulation game, INCEPT case study competition – were held to attract students.

Entrepreneurship and Business Club (EnB Club): The Entrepreneurship and Business Club (EnB Club) is a community where innovative ideas are born and nurtured into successful business ventures. A number of informal sessions were conducted throughout the year as part of EnB Club, and these were received enthusiastically by the institute student community. Formal sessions on Basics of Entrepreneurship, Cloud Computing and Entrepreneurship, and TATA First Dot Workshop in association with National Entrepreneurship were conducted. Informal sessions

on Idea Generation workshop and case studies were also held.

WAVE: The WAVE was a road-trip of electric vehicles covering over 2500 kilometers through southern India. The journey began at Mumbai with stops at Pune, Hyderabad, Bangalore and Goa, visiting schools, colleges, malls, and places of importance along the way. Interactive sessions and exhibitions were conducted at the venues covering a host of topics like "Various Benefits of Electric Cars over IC-Engine Cars" and "Future of Green Technology in the Automobile Industry".

Ideate: Ideate aimed to discover the best ideas and innovations from across the nation that could bring about a positive impact on the society. With more than 1000 registrations across the four broad genres – Earth, Elixir, Inspire India and Utkarsh – mentoring was provided to 128 teams. The total prize money provided to the winning teams was Rs. 4 lakhs. Apart from the prize money, in "Earth" the first team might be funded independently by CIIE and TREFAC-TRIMAP, in "Elixir" the top three teams were provided internships at Tata Research Centre. The winning team of "Utkarsh" was from CTARA. Ideas have been passed on to Techpedia who will circulate them among potential grass-root "ideas innovators".

Placement

Amid fears of global economic slowdown and double-dip recession, IIT Bombay entered its placement season with confidence in its strong corporate relationship. Recruiters have continued to show positive interest in our students. The first phase of IIT Bombay's campus placement in December 2011 saw participation from around 200 companies offering close to 800 jobs. Up to April 30, 2012, around 225 organisations had offered over 950 jobs. Students from Bachelor of Technology (B.Tech.), Master of Science (M.Sc.), Dual Degree (D.D.), Master of Technology (M.Tech.), Master of Design (M.Des.), Master of Philosophy (M.Phil.) and Doctor of Philosophy (Ph.D.) programmes in various fields of engineering, science and technology, design and humanities participated in campus placement.

The process began in July 2011 with invitation to companies to visit the institute for pre-placement talks and provide their job announcements. The talks provided avenues for interaction and familiarisation of students with the recruiting organisations and their work profile. The company interview process began on December 1, 2011, and will continue up to June 30, 2012.

'Day 1': The celebrated 'Day 1' of IITB placement saw 29 organisations representing some of the most coveted firms in the global industry vying for our students. A total of 142 jobs were offered to IITB students on that day – all belonging to the high-end job market – reconfirming the commitment of top recruiters to the IIT Bombay graduates. There was a 20 per cent increase over last year in the number of jobs offered on Day 1.

Commitment towards engineering and technology-oriented jobs: The students of IITB continue to demonstrate their strong commitment to their core educational background in the choice of employment. This is primarily attributed to the highly challenging work profiles and compensation packages offered to IIT graduates by the recruiters. In fact, several students were of the opinion that a larger number of technical job profiles could have been offered by the recruiting companies considering the interest and availability of the students. More than two-thirds of the students opted for science, engineering and technology-oriented jobs with companies operating in various sectors of the economy.

Strengthening presence in the Management Consulting sphere: Over 20 leading management consulting firms, including several global leaders, visited IITB for campus placement this year. These organisations work with large corporations across the globe and help them resolve complex business problems. They are relatively small groups of versatile professionals and carry a reputation of being very selective in their choice of campuses and of keeping extremely high standards in their recruitment process. With the quality of recruits that these companies had last year, they came back with renewed vigour even as some new firms came on board. Around 100 offers were made in the Management Consulting sector.

Increased prominence in the Financial Services sector: Continuing the trend of last few years, the finance sector was a major recruiter this year too. With many of the top global companies in this sector preferring IIT Bombay over other campuses, the sector saw a rush among the top-level as well as the mid-level companies to recruit the brightest and the best from IIT Bombay. A variety of profiles were opened up in the sector as these companies had begun to appreciate the analytical and quantitative analysis capability of the IIT Bombay students. Over 75 offers were made in the Financial Services sector.

Research & Development to the forefront: IIT Bombay saw an increase in organisations hiring fresh graduates in the R&D sector. This sector has been steadily growing in the past few years, and this year the institute saw some premier job offers in it. A total of 13 R&D organisations offered 59 positions this year.

Good response to Government/Public sector opportunities: Several IITB students have shown an inclination towards career in the government/public sector organisations. Leading organisations from government and public sector units, including several Maharatna and Navaratna companies, visited IIT Bombay. This year, ten such organisations recruited 34 students from the campus.

Educating the future generations: IIT Bombay has continued to provide teachers to several educational institutions through campus placement. A total of 23 students, including several with doctoral degree, have been offered jobs with educational institutions.

Diverse recruiters: While the placement season saw recruiters from the entire spectrum of the industry, the initial part of the season was dominated by a variety of firms from sectors like engineering and manufacturing, computer software and hardware, management consulting, finance/banking and FMCG. Most of these firms are world leaders in their respective domains.

Preparing well-rounded students: This year a key focus of the Placement Office was to prepare students for placement. IIT Bombay students are expected to excel not just in technical knowledge but also in leadership, teamwork and other attributes. A large number of preparatory activities were conducted this year for the graduating students, including refresher lectures on various technical subjects. In addition, preparatory programmes to enhance communication skills, interview skills and group dynamics were also organised. A total of 230 preparatory sessions were organised by the Placement Office.

The success of the placement endeavour can be attributed to the outstanding quality of our students as well as the tremendous support provided by the institute administration, academic units, faculty and staff, alumni and other well-wishers.

Programme-wise placement data (2010-2011 data in brackets):

Academic Programme	Registered	Placed*	% Placed
B.Tech.	353 (305)	284 (279)	80 (91)
Dual Degree	206 (225)	181 (214)	88 (95)
M.Tech.	552 (476)	412 (412)	75 (87)
5-yr M.Sc.	14 (16)	11 (14)	79 (88)
2-yr M.Sc.	137 (108)	39 (64)	28 (59)
M.Des.	57 (57)	23# (34)	40 (60)
M.Phil.	5 (7)	0 (3)	0 (43)
Ph.D.	64 (55)	19¶ (11)	30 (20)

* Some eligible students do not actively participate in the placement process.

\# Many companies for are expected to visit during the Design Show in June 2012, for M.Des. students.

¶ There are Ph.D. students who opt for post-doctoral fellowships, faculty/research positions in government institutions or for other career choices without availing of the services of Placement Office. They are not included in this count.

Placement detail by range of salary offered :

Range of Gross Salary (in Lakh Rupees per annum)	Number of Organisations	Number of Offers Received
Above 9.5	62	304
Between 8.0 to 9.5	39	163
Between 6.5 to 8.0	38	123
Between 5.0 to 6.5	56	268
Less than 5.0	30	111
Total	225	969

Placement detail by type of organisation:

Sr. No.	Sector	Number of Organisations	Number of Offers Received
1	Engineering and Processing	64	249
2	Software, IT	54	247
3	Consulting	23	104
4	Finance	15	79
5	Tech	15	74
6	Research & Development	13	59
7	Analytics	14	53
8	Public Sector/Government	10	34
9	Education	4	23
10	FMCG	5	15
11	Services	2	11
12	Others	6	21
Total		225	969

Concluding Remarks

We feel 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 – Dr. Kakodkar has guided us in raising the level of educational and research programmes in our quest for becoming a global institute. In particular, I would like to mention his emphasis on research that is directed to solving national and international problems, and we have taken this quite seriously. I would like to thank the Ministry of Human Resource Development for their continued support to enhance the programme and infrastructure of the institute. Finally, I would like to thank the faculty and staff of the institute for their devoted efforts in taking the institute forward on its path to excellence.

Aerospace Engineering

Introduction

The academic programmes of the Department of Aerospace Engineering focus mainly on 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 other jobs.

The department runs strong undergraduate and graduate programmes 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 programmes include the 4-year B.Tech. degree programme, the 5-year Dual Degree programme, the 2-year M.Tech. programme and the Ph.D. programme.

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–an IIT Bombay student satellite programme initiated over four years back, involving complete design, development and 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. An entirely student project, PRATHAM involvs students from all departments of IIT Bombay and is mentored by faculty from several departments as well as scientists from the Indian Space Research Organization.

The Aerospace Engineering Department at 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 organise 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 governmental aerospace programmes.
- 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. It is with this in view that their education is patterned.

The department faculty strength includes 21 full-time faculty members, one Adjunct Professor and one 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. The department has 350 students out of which about 145 are graduate students and 205 are undergraduate students.

The department has extensive experimental and computational facilities that support its research and teaching activities. Among these are: the Aerodynamics Lab, Instrumentation Lab., Structures Lab., Propulsion Lab., MAV Lab., and the 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 The latest versions of softwares

for teaching aircraft conceptual design and analysis. A Shock Tunnel 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 their aerodynamics. A laboratory is being developed for experimental study of Cardio-vascular Flow Dynamics. The development of an anechoic chamber for high speed jet acoustics measurements has also been planned.

Academic Programmes

Student Intake		
B.Tech.	:	62
Duel Degree		
M.Tech.	:	33
Ph.D.	:	16
Degrees Awarded		
B.Tech.	:	21
M.Tech.	:	29
Dual Degree	:	22
Ph.D.	:	3

The department offers a 4-year undergraduate B.Tech. programme, a 2-year graduate M.Tech. programme, a 5-year integrated Dual Degree (B.Tech. and M.Tech.) programme, and a Doctor of Philosophy (Ph.D.) programme. The specialisations offered this year for Dual Degree and M.Tech. programmes 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 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 the 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 students with a cordial atmosphere and an opportunity to acquire a multi-disciplinary perspective to engineering problems.

Cybergrants Donation by Boeing Co., USA: The Boeing Co. has initiated a partnership with IIT Bombay to include IIT Bombay as part of its University Relations (UR) programme in India. Boeing's support through the UR programme focuses on academic performance scholarship awards and design related activities and events for bachelor's and master's students. Performance and Merit-cum-Means awards were given at functions on the eve of the convocation and during the student festival Zephyr. Eight student teams participated in trying to convert their ideas into designs. Design workshops and competitive events were held as part of Zephyr-2011 and Techfest-2011.

R& D Activities

The department has maintained and nurtured close association with the Aeronautical, Space, Defense and other industries of the country through invited lectures and 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 biomedical engineering. Many of the research programmes pursued in the department are funded by the government agencies such as ARDB and DST, government organisations such as ISRO, DRDO, HAL, BARC, NAL, ADE, GTRE, ADA, as well as private industries like SIEMENS, Pratt and Whitney Co. USA, etc.

Main areas of R&D activity

The departmental faculty actively pursues research programmes that address 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 programmes, 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.

Research activities were related with GPS satellites-based navigation of airplanes, low-earth orbit satellites in formation; point positioning, relative navigation, and orbital control of geostationary satellites in formation; satellite attitude determination; and navigation of lunar spacecraft; satellite payload attitude control; and developed attitude determination and control system for Pratham Nanosatellite of IIT Bombay.

Sponsored Research Projects:

The income received from sponsored research and consultancy projects:

Sponsored Research Projects		
New	:	12
Ongoing	:	41
Completed	:	8
Faculty Involved	:	~19
Sanctioned Outlay	**:**	**Rs. 8,42,23,400/-**

List of sponsored research projects

New Projects

Project Title	Agency Name
Flow Characteristics and Active Separation Control in the AURA Intake Duct with Cowl-lip and Fore-body	ADA
Computing Environment for RCS Analysis of Flying Wing Configurations	ADA
Thermo-Mechanical Failure in CT Tubes under Severe Accident Conditions	AERB
Hardware In-loop Simulation for collaborative missions	ARDB
Unsteady Incompressible Turbulent Flow Computations on Static/Moving Grids	ARDB
Parametric study of contra-rotating axial flow fans under different inflow conditions and design modifications based on the parametric study	ARDB
Development of non-linear Lamb wave based techniques for prediction of damage modes and their propagation in composite laminates	ARDB
Engineered Surfaces on Pyrolytic Carbon for Bio-Medical Applications	CSIR
Development of principles of eco-friendly technologies of gas combustion on the base of micro channels technologies	DST
Hardware in loop simulation (HILS) for collaborative missions (11ARDB001)	DST
Manufacturing of MAVs (10ARDB004)	DST
R&D in collaborative missions-Phase 1 (10ARDB003)	DST
Compact Linear Fresnel Reflector (CLFR) for Solar Thermal Power and Process Heat	Indo-German Science and Technology Centre
FOSSEE: Free/Open Source Software in Science and Engineering Education (Assimilation of Open source Software in Science and Engineering)	Min.HRD

Ongoing Projects

Project Title	Agency Name
Sponsored Projects initiated in 2010-11	
Estimation of Angle of Attack in Mini Aerial Vehicles	ARDB
Centre fro Aerospace Systems Design and Engineering (CASDE) - Phase-III.	ARDB
R & D in Collaborative Missions - Phase 1	ARDB
Manufacturing of MAVs	ARDB
Study of Flow Characteristics of the Fontan's Circulation with Energy Booster	ARDB
Numerical Modelling of Deflagration to Detonation Transition (DDT) in a Detonation Tube with Commercial CFD Software.	DRDO
IIT(B) STC/ Viscous Drag on a Scramjet Engine in a Shock Tunnel through Wall Heating Rate Measurements.	ISRO
Sponsored Projects initiated in 2009-10	
Co-ordinatorship Allowances.	ARDB
Upgradation of Associate CFD Centre at IIT, Bombay	ARDB
Development of Liquid Fuel Based Combustor Operating in Flameless Combustion Mode.	ARDB
DST – Fist to the Aerospace Engineering Department	DST
IIT(B) STC/ Development of High Resolution Schemes for Flow Computations on Space Vehicle Configurations using Unstructured Grids	ISRO
IIT(B) STC/ Transonic Buffeting of Expendable and Reusable Launch Vehicles	ISRO
IIT(B)STC / Study of Shock Turbulent Boundary Layer Interaction in High Speed Air Intake - Phase II	ISRO
IIT(B)STC / IITB Student Satellite Project (ISSP)	ISRO
Assimilation of Open Source Software in Science and Engineering Education	Min. of HRD
Virtual Laboratory Experiments	Min. of HRD
NAL/ Hardware-In-Loop-Simulator for MAV Applications	NAL
De-sensitised Tip Design for Axial Flow Compressors.	Pratt & Whitney-Canada
Sponsored Projects initiated in 2008-09	
Co-operative Control of Fixed Wing MAVs.	ARDB
Development of Baseline Free Damage Detection Technique for Laminated Composite Structures.	ARDB
Noise Suppression of High Subsonic Free Jets.	ARDB

Project Title	Agency Name
Steady/ Unsteady Low Speed Viscous Flow Computations on Static / Moving Grids.	ARDB
MAV to Monitor Areas of Interest Continuously without Human Intervention.	US Department of Defence
Sponsored Projects initiated in 2007-08	
Axial Fan Performance Evaluation and Enhancement Strategies under Static and Dynamic Inflow Distortions.	ARDB
Novel Strength Enhancing Insert Assemblies.	ISRO
Assessment of Turbulence Models in Hypersonic Reacting Three-dimensional Flow around Re-entry Flight Vehicles. (IITB STC)	ISRO
Siemens Power Generation Inc./ Annular Diffuser Aerodynamics for Turbine Delivery System.	International Collaboration
Sponsored Projects initiated in 1991-92	
Multi Block Grid Generation in Three Dimensional Domains	ARDB
Completed Projects	
Sponsored Projects initiated in 2008-09	
Development of Bayesian Framework for Calibration of Twin Spool Turbofan Engine.	
Sponsored Projects initiated in 2007-08	
Capability Development to Meet MAV08 Mission Requirements.	DRDO
Development of a Three Components Accelerometer Balance for use in IITB Shock Tunnel (IITB STC)	ISRO
Garuda Grid Computing Workshop at IIT Bombay on 28-30.06.2007 Organisations	Private
Sponsored Projects initiated in 2006-07	
Thermodynamic Design of Wankel Engine.	DRDO
Sponsored Projects initiated in 2005-06	
Experimental Investigation of Flow Over After-burner Diffuser cone.	DRDO
Estimation of Aerodynamic Coefficients of 450kg Bomb using CFD.	DRDO
Sponsored Projects initiated in 2004-05	
Centre of Excellence for Aerospace Systems Design and Engineering (CASDE) Phase -II	ARDB

Consultancy Projects

Number of Jobs	:	10
Number of Faculty Involved	:	3
Income Generated	:	Rs. 10,25,800/-

Patents

Method and injector for controlling gas flow in a duct, Indian Patent Application No 2206/MUM/2011, Co-inventors: Prof. A.M.Pradeep, Prof. Bhaskar Roy, Dinesh Bhatia.

Extension activities

An annual symposium of Aerodynamics Panel of the Aeronautical Research and Development Board was conducted at IIT Bombay during 17-18 May, 2011.

Visitors to the Department

The following visited the department and delivered lectures:

Dr. R.V. Kamath, TCS-Mumbai, "Engineering Analysis Using Free And Open Source Software (F/OSS)", on 07-June-2011.

Mr. Ajit Mahendra, Scientist, BARC, Trombay, Mumbai, "Tour inside OpenFOAM" on June 7 and September 21, 2011

Dr. Vivek Sanghi, Scientist, Roll-Royce, "Rolls-Royce Operations in India" on 5th July 2011.

Dr. Debasis Chakraborty, Tech. Director, DRDL, Hyderabad, "Computational Fluid Dynamics (CFD) application in the Design and Analysis of Missiles" on 19th July 2011.

Mr. Rajeev Verma from Boeing IVHM Center in Cranfield, Cranfield university, UK, "Integrated Vehicle Health Management on Aug. 3, 2011.

Dr. Ananthkrishnan, from Consultant Ideas Research, Bombay, "Innovation and Entrepreneurship for Aero space Engineers" on 24th Aug. 2011.

Prof. Amit Bhatia, from Rice University, USA, "Algorithmic Techniques for Design and analysis of High-confidence Physical Systems" on 16th Sept.2011.

Prof. Tapan Sengupta, Aerospace Dept. IIT Kanpur, "Turbulence Demystified" on 7th Oct.2011.

Prof. Farhan Gandhi, Dept. of Aero. Engg., Pennsylvania State University, USA, "An overview of Recent Activities in Morphing Helicopter Rotor and Adaptive Aero-structures at Penn. State" on 14th March, 2012.

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

Unhelkar, V.V., Hablani, H.B.
"Satellite Attitude Determination with Earth and Sun Sensors and Gyros using Steady-state Kalman Filter," *Advances in Control and Optimization of Dynamical Systems, (ACODS),* IISC, Bangalore, February 16-18, 2012

Biswas, S, Hablani, H.B.
"Lunar Trajectories of Spacecraft for Navigation, with Application to Chandrayan-2," *Advances in Control and Optimization of Dynamical Systems, (ACODS)*, IISC, Bangalore, February 16-18, 2012

Agarwal, S., Hablani, H.B.,
"Automatic Aircraft Landing over Parabolic Trajectory using Precise GPS Measurements," *International Journal of Computer Applications (IJCA) Proceedings on International Conference and workshop on Emerging Trends in Technology (ICWET)* (7):38-45, 2011, published by Foundation of Computer Science

Vinod Kumar, H. B. Hablani
"Relative Motion Control of Geostationary Satellites in Formation," Paper No. IAA-AAS-DyCoSS1-12-04, IAA *Conference on Dynamics and Control of Space Systems*, Porto, Portugal, March 19-21, 2012

Mandal,J.C.
5th Symposium On Novel Ideas In CFD (SONIC 2012), 25 January 2012, International Institute of Information Technology, Pune.

Humboldt Kolleg on Science Globalization and Human Development, Goa, November 11-13, 2011.

Second International Conference on Computational Methods for Thermal Problems, *THERMACOMP2011*, September 5-7, 2011, Dalian, China.

"Numerical Shock Instabilities in High Speed Flows", (Invited) *5th Symposium On Novel Ideas In CFD (SONIC 2012)*, 25 January 2012, International Institute of Information Technology, Pune.

J.C. Mandal, C.R. Sonawane
"Simulation of Flow Inside Differentially Heated Rotating Cavity", *Second International Conference on Computational Methods for Thermal Problems, THERMACOMP2011*, September 5-7, 2011, Dalian, China.

Mitra, M.
"Ocean and Atmospheric Sciences: Current Trends" in the *National Workshop on Wavelet, Multi-resolution and Multi-fractal Analyses in Earth,* held on Feb. 29-Mar. 02, 2012 at Department of Earth Sciences, IIT Bombay, Mumbai 400076

Sinha,K.
High Performance Computing in India: Present Challenges and Future Endeavors, IIT Bombay, 13 June 2011.

Presented two papers in *the 28th International Symposium on Shock Waves*, 17-22 July 2011, The University of Manchester, United Kingdom.

Sarvesh S, Nithiyaraj M, Pawar,V., Sinha, K.
"Effect of Side-fence on Shock/Boundary Layer Interaction in a Scramjet Inlet", *Symposium on Applied Aerodynamics and Design of Aerospace Vehicle (SAROD2011),* November 16-18, 2011, Bangalore, India.

Sinha, K., Rane, N.J. and Pawar, V.
"Numerical Investigation of Three Dimensional Shock/ boundary-layer Interaction in a Hypersonic Inlet", *28th International Symposium on shock waves*, The University of Manchester, United Kingdom, 17-22 July 2011.

Pasha, A.A., Vadivelan, C., Sinha, K.
"Simulation of a Practical Scramjet Inlet using Shock-unsteadiness Model", *28th International Symposium on Shock Waves*, The University of Manchester, United Kingdom, 17-22 July 2011.

Sudarshan Kumar
22nd National conference on I. C. Engines and Combustion, 10-13th Dec 2011, NIT Calicut, India.

8th International conference on Flow dynamics, Tohoku University, Sendai Japan Nov. 9-11, 2011.

International Conference on Advances in Energy Research, Indian Institute of Technology Bombay, Dec., 9-11, 2011.

47th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, San Diego, USA, (2011).

23rd International Colloquium on Dynamics of Reactive and Explosive Systems, University of California, Irvine, USA, 24-29 July 2011

N. Sachdeva, U. W. Taywade, A. Deshpande, Sudarshan Kumar
"Experimental Studies on Flame Stabilization in a Three Step Micro-combustor," *22nd National conference on I. C. Engines and Combustion,* 10-13th Dec 2011, NIT Calicut, India.

D. Sawant, V. M. Reddy, D. Trivedi, Sudarshan Kumar
"Computational Analysis to Determine the Optimal Burner Geometry for Achieving Flameless Combustion with Liquid Fuels," *22nd National Conference on I. C. Engines and Combustion,* 10-13th Dec 2011, NIT Calicut, India.

R. Jithendra, S. Kumar, Sudarshan Kumar
"Active Control of Lean Premixed Combustion Instabilities in a Notional Gas Turbine Combustor," *22nd National conference on I. C. Engines and Combustion,* 10-13th Dec 2011, NIT Calicut, India.

M. Akram, R. Fursenko, S. Minaev, Sudarshan Kumar
"Flame propagation in diverging microchannels" *8th International conference on flow dynamics*, Tohoku University, Sendai Japan Nov. 9-11 2011.

S. Minaev, R. Fursenko, A. Fan, Sudarshan Kumar, Kaoru Maruta
"Oscillating and Rotating Flame Patterns in Microchannels," *8th International conference on flow dynamics*, Tohoku University, Sendai Japan Nov. 9-11 2011.

V M Reddy, D. Trivedi, Sudarshan Kumar
"Investigation of Lifted Flame Dynamics with Biodiesel in Coflow Field", *International Conference on Advances in Energy Research*, Indian Institute of Technology Bombay, Dec., 9-11, 2011.

"Experimental investigations on lifted spray flames in a co-flow field," *23rd International Colloquium on Dynamics of Reactive and Explosive Systems*, University of California, Irvine, USA, 24-29 July 2011.

M. Akram, Sudarshan Kumar
"Laminar burning velocity of LPG-air Mixtures using Mesoscale Diverging Channel", *International Conference on Advances in Energy Research*, Indian Institute of Technology Bombay, Dec., 9-11, 2011.

"Experimental Studies on the Dynamics of Premixed Methane-Air Flames in Various Aspect Ratio Channels," *23rd International Colloquium on Dynamics of Reactive and Explosive Systems*, University of California, Irvine, USA, 24-29 July 2011.

Nandan Kulkarni, Sudarshan Kumar
"Investigating the Role of H_2O_2 injection on the Combustion of Composite Propellants", *8th International High Energy Materials Conference and Exhibit*, TBRL, Chandigarh, 10-12 Nov. 2011.

P. Sunitha, Z. Jelic, Sudarshan Kumar, H.Amer, Adalat Ali[1], J.RamMohan
"Analysis on Grain Structural Integrity of Gun Launched Rocket assisted Projectile – Range Enhanced Projectile (REP)," *8th International High Energy Materials Conference and Exhibit*, TBRL, Chandigarh, 10-12 Nov. 2011.

A. Dixit, Sudarshan Kumar
"Numerical Simulation Scheme for Nose Shaped Charge for Analysis, Design and Performance Optimization," *8th International High Energy Materials Conference and Exhibit*, TBRL, Chandigarh, 10-12 Nov. 2011.

A. A. Deshpande, Sudarshan Kumar
"Experimental Studies on Flame Stabilization in Backward Facing Step Microcombustors," *47th AIAA/ ASME/SAE/ASEE Joint Propulsion Conference and Exhibit,* San Diego, USA, (2011).

Mulay, S.S., et al.
"Attitude Determination and Control of Pratham, Indian Institute of Technology Bombay's First Student Satellite," Paper No. IAA-AAS-DyCoSS1-13-11, IAA *Conference on Dynamics and Control of Space Systems*, Porto, Portugal, March 19-21, 2012

Pant, R. S.
"Application of Partially-averaged Navier-Stokes (PANS) method to simulate turbulent flow around an airship", *IUTAM Symposium on Bluff Body Flows*, December 12-16, Kanpur, India

Venkata Rao, B. V. and Sharma, S.D.
"Measurements in Flow Past Yawed Circular Cylinder", in *ICFD2011*, (2011), Sendai, Japan, November 9-11,2011.

Muskawad, S.D. and Sharma, S.D.
"Pulsatile Flow through Mechanical Heart Valve", in *ICFD2011*, (2011), Sendai, Japan, November 9-11,2011.

Bhaskar Roy
American Society of Mechanical Engineer's Conference, ASME/ IGTI Turbo Expo 2011, at Vancouver, Canada on June 14 to 18, 2011.

International Symposium on Air Breathing Engines, ISABE 2011, Gothenburg, Sweden, Sept, 2011.

11th Asian Fluid conference on Fluid Machineries, IIT, Madras, Nov., 2011.

"Design, CFD Analysis Of High Hub-To-Tip Ratio Compressor Blade At Low Speeds", *11th Asian Fluid Conference on Fluid Machineries*, IIT, Madras (with Prof A.M.Pradeep)

C.Ramprasadh, Arya, H.
"Estimation of Aerodynamic Angles in a Mini Aerial Vehicle under Turbulent Atmosphere", *AIAA Atmospheric Flight Mechanics Conference,* Portland, 8th-11th August 2011. AIAA-2011-6517

Mahajani, R. Arya , H.
"MAV - Hardware In Loop Simulation using LabVIEW", *AIAA Modeling and Simulation Technologies Conference*, Portland, Oregon, Aug. 8-11, 2011, AIAA-2011-6622

Dileep Krishnan K., Borkar,A.V., Shevare, P., Arya, H.
"Hardware-in-Loop Simulator for Multiple MAVs for Cooperative Missions", *Second International Conference on Advances in Control and Optimization of Dynamical Systems (ACODS) – 2012*, 16-18 February 2012,Bangalore,India.

Vivek G. P., Sinha,A., Arya, H.
"Cooperative Target Capturing in Minimum Time", *Second International Conference on Advances in Control and Optimization of Dynamical Systems (ACODS) – 2012*, 16-18 February 2012,Bangalore,India.

Sharan, N., Chatterjee, A.
"Intermittent Communication in Parallel Computation" *23rd International Conference on Parallel Computational Fluid Dynamics*, Barcelona, Spain, May 2011.

Conferences/Symposia/Workshops/ Seminars (Coordinated/Chaired by Faculty)

Prof. Sinha,K.
Organised a workshop on *Advanced Instability Methods (AIM 2012)* from 20-22 January 2012 at IIT Bombay. It had about 60 participants from different institutions in India and abroad.

Prof. Sharma, S.D.
Organised a one day workshop on *Overview of Aerodynamics Research and the Current Status in India* on 16 May, 2011. Experts in various disciplines of Aerodynamics field were invited from all over the country. In all 9 talks were delivered and about 70 participants attended the program.

Prof. H.B. Hablani
Conducted a *5-day CEP and QIP Course: Navigation and Guidance of Flight Vehicles*, June 13 -17, 2011.

Pant, R. S.
Conducted a lecture series on *Aircraft Conceptual Design and LTA Systems*, Aerospace Engineering Department, Amrita Vishwa Vidyapeetham, Coimbatore, India, January 28-20, 2012 and November 14-15, 2011.

Conducted a lecture series on *Aircraft Conceptual Design*, Aerospace Engineering Department, Indian Institute of Space Science and Technology, Trivandrum, India, September 13-14, 2011 and August 12-13, 2011

Mahulikar, S.P.
Chairman for Session B6: "Micro & Nano Flows", *7th International Conference on Computational Heat and Mass Transfer, 2011*, Istanbul, Turkey.

Prof. Viren Menezes
Chaired the session on "Shock Waves and Biology", at *the 2nd National Symposium on Shock Waves*, held during February 27-28, 2012, at Periyar Maniammai University (PMU), Thanjavur, Tamil Nadu, India.

Invited Lectures

Bhaskar Roy,
"Aerodynamics of Contra-Rotating Axial Turbomachines" - *11th Asian Fluid conference on Fluid Machineries*, IIT, Madras, India.

Hablani, H.B.
"Autonomous Guidance and Inertial Relative Navigation for Spacecraft Rendezvous using Imaging Sensors Misaligned with Inertial Sensors," *ISRO Satellite Center, Structured Training,* August 2011.

"Relative Navigation and Formation Control of Geostationary Satellites," *Advances in Control and Optimization of Dynamical Systems, (ACODS)*, IISC, Bangalore, February 2012

"Flight Vehicles Guidance, Navigation, and Control Technology," *National Seminar on Advancement in Material Processing and Production Technology*, at Department of Mechanical Engineering, Gyan Ganga, Institute of Technology and Sciences, Jabalpur, February 24-25, 2012.

Mandal, J.C.
"High speed flow computations on unstructured grids using a novel high resolution scheme" and "Incompressible flow computations over static and moving boundaries using artificial compressibility method", on May 12, 2011, at Fluidyn, Bangalore,India.

Mahulikar, S.P., Gulhane, N.P., Pradhan, S.D., & Prabhu, S.V.
Keynote Lect. "Pressure drop in laminar micro-convective Flow due toVvariable Properties of Compressible Fluid", *7th International Conference on Computational Heat and Mass Transfer*, Istanbul, Turkey.

Pant, R. S.
"Design, Build and Flight Demonstration of a Remotely Controlled Airship", at *DST-INSPIRE Science Camp*, IIT Delhi, December 30, 2011;

"From Concept to Reality in less than a month: Design-build-fly project of R C airship in Manali" Muffakham Jah College of Engineering and Technology, Hyderabad, December 28, 2011;

"R & D in Lighter-Than-Air Systems at IIT Bombay", *ViGYAN Associates*, on September 23, 2011 at Hampton, VA, U.S.A.;

"Design and Development of Lighter-Than-Air systems at IIT Bombay", on June 21, 2011 at Texas A & M University, College Station, Texas, USA;

"Optimization in Aircraft Conceptual Design", on April 28, 2011 at Department of Mechanical and Nuclear Engineering, College of Engineering, The Pennsylvania State University, PA, USA;

"Generalized Cost Optimization of Short-Haul Twin-Turboprop aircraft including Airport considerations", April 11, 2011 at School of Aeronautics and Astronautics, Purdue University,U.S.A;

"Investigation of Strategies used by ATCOs to reduce Cognitive Workload", on April 8, 2011 at Sensis Corporation, Sensis Seagull Technology Center, San Jose, CA, USA;

"Transportation of goods and passengers to remote areas using airships: Two case studies in India", on April 7, 2011 at NASA Ames Research Center, Moffett Field, CA, U.S.A.

Sinha, K.
"Simulation of Hypersonic Flows in Real-life Configurations" at *the Symposium on HPC Applications*, IIT Kanpur, 12-14 March 2012.

Sharma, S.D.
"Vortex Flows in the Wake of a Blunt Trailing Edge", Mechanical Engineering Department, Osaka University, Japan, 7 November, 2011.

Significant Awards/ Distinctions

Prof. S.P. Mahulikar
Appointed to the prestigious "DFG-sponsored Mercator Chair Professorship" (Visiting) at Hamburg Univ. Technology w.e.f. Dec'11 (on sabbatical from IIT-Bombay).

Prof. Sudarshan kumar
The IIT Bombay Young Investigator Award for the Year 2011 (2012)
INAE Young Engineer Award (2011).

Guruprasad,P.J.
Young Faculty Award, IIT Bombay, 2011.

Honorary Work

Pradeep, A.M.
Reviewed papers for the AIAA Journal, Transactions ASME, Journal of Fluids Engineering, Journal of Computers and Fluids, Journal of Aircraft, ASME Turbo Expo 2011.

Chaterjee, A.
Reviewed papers for Progress in Electromagnetics Research (PIER) and International Journal of Aerospace Engineering

Guruprasad, P.J.
Reviewed papers for International Journal of Solids and Structures, Aug 2011.

Hablani, H.
Served as Associate Editor for AIAA Journal of Guidance, Control and Dynamics and IEEE Transactions on Aerospace and Electronic Systems; International Advisor for AIAA Journal of Guidance, Control and Dynamics; and as Reviewer for Acta Astronautica, Elsevier Publication and Defense Science Journal, DRDO, India.

Mandal, J .C.
Served as expert member of Nuclear Reactor & Fuel Cycle (NRFC), Process Engg. and CFD subcommittee, Board of Research in Nuclear Sciences (BRNS), and Expert Member of Homi Bhabha National Institute (HBNI), Bhabha Atomic Research Centre, Mumbai; reviewed manuscripts for international journals such as (i) Numerical Heat Transfer - An International Journal of Computation and Methodology; (ii) Heat Transfer Engineering; (iii) Computers and Fluids; (iv) International Journal for Numerical Methods in Fluids; and (v)International Journal of Computational Fluid Dynamics.

Pant, R. S.
Served as member of the Executive Committee of Mumbai Branch of The Aeronautical Society of India, 2011-12.

Sinha,K.
Reviewed papers for Physics of Fluids, International Journal of Hypersonics and Computers and Fluids.

Kumar Sudarshan
Reviewed papers for the following journals: (a) Combustion and Flame, (b) Proceedings of the combustion institute, (c) International journal of hydrogen energy, (d) Fuel, (e) Aerospace Science and Technology, (f) Energy and Fuels; (g) International journal of Emerging Multidisciplinary fluid sciences, (h) Recent patents in Engineering, (i) International journal of hypersonics, (j) Defence Science journal, (k) Combustion Science and Technology, (l) International journal of heat and mass transfer, (m) International journal of Aerospace Engineering, (n) Journal of Combustion, (o) Power Propulsion research, and (p) Turbo Expo 2012

Menezes,V.
Reviewed paper for *International Journal of Hypersonics*, September 2011.

Faculty Members and their Specializations

1. Pradeep A. M.
Active and passive flow control , Flow characteristics of internal flows and turbomachinery, Design and performance enhancement strategies in turbomachinery

2. Hemendra Arya.
Mini/Micro Aerial Vehicle system Design, Autonomous aerial Vehicles, Hardware-In-Loop-simulation, Systems Engineering, Co-operative missions

3. Kowsik V R Bodi
Areas of Interest: Propulsion, High Enthalpy Flows, Heat Transfer, Plasma physics, Turbulence, transport and structure formation

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

5. Guruprasad P. J
Mechanics of Materials

6. Hari Hablani
Guidance, Navigation and Control of Flight Vehicles

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

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

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

10. Jadav Chandra Mandal
Computational Fluid Dynamics

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

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

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

14. Niranjan Naik
Polymer Matrix Composites, Textile Composites,

15. Rajkumar Pant
Lighter-Than-Air systems, Aircraft Design, Air Transportation, Optimization

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

17. Bhaskar Roy
Aircraft Propulsion, Axial Flow Compressor, Gas Turbine Aerodynamics

18. 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

19. Gopal Shevare
Grid Generation, Computational Fluid Dynamics

20. Rameshchandra Shimpi
Theory of Plates, Finite Element Method, Evolutionary Optimization, Material Testing, Experimental Stress Analysis

21. Krishnendu Sinha
Computational fluid dynamics, Turbulence modeling, Hypersonic flows

22. Sudarshan Kumar
Combustion and Propulsion, Flameless and mild combustion, Micro combustion, Pattern formation of flames and propulsion

23. Krishnarao Sudhakar
Systems Design, Complex Systems, Systems Engineering

Biosciences & Bioengineering

Introduction

The Department of Biosciences and Bioengineering comprises two broad areas representing Biotechnology and Biomedical Engineering. The department aims to create an ambience for the smooth pursuit of scholarly activity in research and education, 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 area at IIT Bombay. The department has 21 core faculty members and is 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. The names of newly joined faculty members are : Prof. Prasenjit Bhaumik and Prof. Prakriti Tayalia.

The department has the following infrastructural facilities: Micro plate detection system; Inverted microscope; Protein purification system; Real time PCR; Table top centrifuge; Spectrofluorimrter; UV Visible spectrophotometer; Ultracentrifuge; High pressure homogenizer; UV visible spectrophotometer & PCR; Workstations; and HF NMR Spectrometer

Academic Programmes

The academic programmes currently consist of the DBT-supported M.Sc Biotechnology programme, the M.Sc.-Ph.D. dual degree programme in Biotechnology, M.Tech in Biomedical Engineering programme, and the Ph.D. programme. The M.Tech. programme 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 draws large number of applicants. The institute has boosted the academic activity of the department by funding four new scholarships 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 terms of students' career profiles and the quality of instruction, as evident from student feedback. Extensive interactions with various groups in Electrical Engineering, Chemical Engineering, Aerospace Engineering, Computer Science, Chemistry and Mathematics make the departmental research activities truly interdisciplinary.

Degrees Awarded		
M.Sc.	:	22
M.Tech.	:	18
Ph.D.	:	09

The recruitment of faculty of diverse backgrounds has led to the introduction of new courses in the department which can be taken by students from various other departments. These include topics in Evolution, Mathematics for Biologists, Cell Mechanics and Mechanobiology, Introduction to Biomechanics, Introduction to Molecular Cell Biology, Cell Cycle and Epigenetics, NMR in Biological Systems and General Virology.

R&D Activities

Research in the department encompasses both basic biology and applied bioengineering topics. As part of the Wadhwani Foundation, cancer has been identified as a thematic focus area of research. Several faculty members have participated in organizing international conferences in India and abroad. The following are the Main thrust areas of R&D activity: Biotechnology, Biochemistry and Molecular enzymology, Bioelectricity; Bioinformatics, Biointerfaces, Biomaterials, Biomechanics, 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.

Sponsored Research Projects

Sponsored Research Projects :		
New	:	29
Ongoing	:	37
Completed	:	01

List of sponsored research projects

New Projects

"Integration Platform for III-V Semiconductors with Polymer Waveguides and Micro-Fluidic Channels" by ARDC of DST

"Development of Near InfraRed stimuli responsive nanoparticles for targeted cancer therapy" by ARDC of DST

"Probing the relationship between extracellular matrix(ECM) ligand and invadopodia formation in breast cancer" by BRNS

"Comparative genomics analyses of glycosylation pathways in completely sequenced bacterial genomes" by BRNS

"Studying Mechanism of Copy Number Control of Naturally Harboring Plasmid of budding yeast, a widely used Multicopy Eukaryotic Vector" by CSIR

"In-house Production of Human Proteome Arrays to Study Pathways and Protein Interaction Networks in Brain Tumor" by CSIR

"The assembly dynamics of Mycobacterium smegmatis FtsZ and its role in cytokinesis" by CSIR

"Dissection of stucture function correlation of an allosteric signal transducer of the gal genetic switch of saccharomyces cerevisiae using experiment and computational approach" by CSIR

"Studies on dna and protein translocation machinery of bacteriophage N4" by CSIR

"Understanding the mambrane interactions of oligometric states of amyloidognic proteins by solid-state NMR" by CSIR

"Effects of tau glycation and phosphorylation on stability and dynamics of microtubules and on differentiation of neuronal cells: Therapeutic implications for neuropathies" by DBT

Mechanobiological regulation of embryonic stem cell self-renewal and differentiation" by DBT

"Computational Studies On Bladder Biophysics With Special Reference To Possible Mechanisms In Over activity" by DBT

"Assessment of thrombolytic potential and anticancer activity of fibrinolytic enzymes purified from Russell's viper venom and bacteria isolated from NE-India" by DBT

"Understanding the formation of neurotoxic á-synuclein oligomers associated with Parkinson's disease", by DBT

"Studying the heterogeneity of gliomas for the tumor antigen identification using proteomics and histology & generation of metabolic map using radiology" by DBT

"Elucidating the factors responsible for spatio-temporal regulation of association between cohesin and chromatin in executing faithful chromosome segregation during meiotic cell cycle using budding yeast as a model system" by DBT

"A dynamic insight into bio-molecular assemblies using solution and solid - state NMR" by DBT

"Mycobacterial genes that are orthologs of prokaryotic N-linked glycosylation pathway enzymes: cloning and expression, and characterization of the protein products" by DBT

"Role of Polo-like kinases in regulating microtubule dynamics, cell cycle and cell migration" by DBT

"Understanding Genome Organization and Gene Expression In Hexachlorocyclohexane (HCH) Degrading Bacteria and the HCH Dumpsite" by DBT

"DBT- Research Assistantship of Dr. Radhika J. Poojari" by DBT

"Centre of Excellence in nanoelectronics - Phase -II a joint project between IIsc,Bangalore & IIT Bombay" by DIT

"Role of FtsZ assembly dynamics in Z-ring formation and bacterial cell division" by DST

"Nanoparticulate cosmetics for nutrient delivery in pregnancy.(global innovation award scheme)" by BILL AND MELINDA GATES FOUNDATION

"RDF Share of Project Investigators & Co-PI's involved in NANO Phase –II" by IRCC - DIT OH

"Clinical Proteomics RT Virtual Lab" by MHRD

"Localized Surface Plasmon Resonanace (LSPR) Based Optoelectronic Biosensors" by NMRL"Systematic studies on Localized Surface Plasmon Resonance (LSPR) based biosensor using ATR technique and its potential for DNA/antibody detection" by NMRL

"Novel Multifunctional Ultrasound Triggered and Targeted Nanoparticles for Cancer Therapy" by Samsung Electronic Ltd.

Ongoing Projects

"Serum profiling of malaria patients by using proteomic techniques" by BRNS

"BRNS/ Nanoengineered Alginate Carrier Glucose Sensors Using Competitive Binding Resonance Energy Transfer Assays Based on Apoenzymes" by BRNS

"BRNS/ Functional promiscuity of arginase in Aspergillus niger metabolism" by BRNS

"Role of microtubules dynamics in cell cycle and cell motility: Implication in cancer chemotherapy" by BRNS

"Sequence Dependent Oligomerization of a-synuclien: Relevance to Parkinson's Disease" by CSIR

"Gold Nanostructures and polymeric nanoparticles for breast cancer therapy" by DBT

"Drug loaded surfactant nanoparticles for therapy in acture respiratory distress syndrome" by DBT

"Proteomic analysis of human gliomas for biomarker discovery" by DBT

"Nanoengineered Calcium-Sensing Tattoo Materials for Early Diagnosis of Milk Fever" by DBT

"Oligomerization of a Synuclein in Parkinson's Disease (PD)" by DBT

"Nanoengineered Lab-on-a-Particle System" by DBT Innovative Yong Biotechnologist Award

"Force generation by Actin and Microtubules" by DBT Innovative Yong Biotechnologist Award

"DBT- Project Assistantship of Mrs. Meghna Singh" by DBT

"DBT- Project Assistantship of Mrs. Dipty Singh" by DBT

"Development of Multifunctional Magnetic Nanoparticles for Cancer" by Department of Information Technology

"Understanding and modulating the alpha-synuclein aggregation in Parkinson's disease" by DST

"Study of regulatory factors involved in chromosome dynamics during meiotic cell division using budding yeast, Saccharomyces cerevisiae as a model system" by DST

"Deciphering the role of KRH1 and KRH2 in glucose and ammonium mediated signaling of filamentation response in" by DST

"Nanoparticles for delivery of anticancer drugs in resistant tumors" by Indo-US Science & Technology Forum, New Delhi

"Proteomics Laboratory" by MHRD

"Wadhwani center of excellence" by Wadhwani Foundation

"Structure and Functional Characterization of Bacterial Cell Deivision Protein SepF and UgtP and their roles in Z-Ring and Septum formation" by BRNS

"Characterization of the fermentative pathway in Pichia pastoris and study of its role in central carbon metabolism" by BRNS

"Nanoengineered "smart tatoo" lactate sensors" by CSIR

"In Search of the novel pathways, enzymes or operons involoved in the degradation of aromatic compounds using metagenomic approach" by DBT

"DST/ Controlled Drug Delivery using Layer-by-Layer Self-Assembly with Antibody Conjugated Magnetic PLGA Nanoparticles using Dual Drug Regimen for Breast Cancer Therapy" by DST

"DST/ Development and evaluation of injectable biopolymer based scaffolds for cartilage tissue engineering" by DST

"Financial assistance for organization of 'One Day Satellite Workshop on Cancer & Nanotechnology : Therapeutics and Diagnostics " by DST

"A lab on chip of Cardiac Diagnostics" by Aeronautical Development Agency

"In Vivo Choice of Translation Initiation Sites (TISA) in the Human Malaria Parasite P. falciparum" by BRNS

"Population heterogeneity in Saccaromyces Cerevisia: Causes and Consequences of Phenotypic Variation" by BRNS

"Development of Anti-Malarial Therapeutics Based on Chemically Modified Small Interfering RNAs" by DBT

"Urease and cresol-red immobilized nanoengineered alginate microspheres as sensors for urea monitoring" by ICMR

"Computational investigations into the mechanisms of information processing in medium spiny projection neurons in relation to reward processing and learning" by DBT

"Development of nanoparticles and nanovesicles for delivery of anticancer drugs through inhalation route", sponsored by Private Organisations

"Centre for Nano Technology (Nano-electronics.....nanobiotechnology" by DST

"M.Sc./M.Tech. (Biotech.) Programme" by DBT (1985-86 onwards)

Completed Project

"Exploration of Design and Fabrication of Sensors for DEtection of Explosives" by DRDO (Technically Closed)

Consultancy Projects

No of Jobs:	03
Faculty involved:	01

Patents

Patents application filed:	12
Patents granted:	0

Visitors to the Department

Dr. Venki Ramakrishnan, Nobel Prize Winner in Chemistry – 2009, Structural Studies Division, MRC Laboratory of Molecular Biology, Cambridge, England. He gave visit to our department and interacted with research scholars and faculties.

Dr. Romesh Wadhwani, Chairman, Wadhwani Foundation & Founder, Symphony Technology Group. He inaugurated the Wadhwani Research Centre in Biosciences and Bioengineering (WRCBB), by unveiling the ceremonial plaque at IIT Bombay.

Nilesh Banavali, Research Scientist, Laboratory of Computational and Structural Biology Division of Genetics, Wadsworth Center, Assistant Professor, Department of Biomedical Sciences, Center of Medical Sciences New Scotland Ave. He delivered a lecture on "Answering structure-function questions in macromolecular complexes through molecular modeling."

Dr. Apurba Kumar Sau, Staff Scientist, National Institute of Immunology, JNU Campus, New Delhi. He delivered a lecture on "Regulation of GTP hydrolysis in interferon-gamma induced GTP-binding proteins."

Vishal S. Vaidya, Ph.D., Assistant Professor, Harvard Medical School. He delivered a lecture on "Kidney Exposure Biology: Biomarkers and Biosensors to the Rescue."

Siddharth Ramakrishnan, Ph.D., Postdoctoral Research Scientist, Dept of Electrical Engineering, Columbia University, New York. He delivered a lecture on "Reductionist and Organismal approach to Neuroscience: Perspectives from experiments with microelectrode arrays and transgenic animal models."

Dr. Madhulika Dixit, Laboratory of Vascular Biology, Department of Biotechnology, Indian Institute of Technology Madras. She delivered a lecture on "Chronic Hyperinsulinemia induces Endothelial Inflammation via A Mechanism Involving Protein Tyrosine Phosphatase SHP2."

Prof. Ashok Prasad, Dept of Chemical and Biological Engineering, Colorado State University. He delivered a lecture on "Cross-talk and information transfer in some simple signaling circuits."

Prof. Mirza Faisal Beg, Biomedical Engineering, Simon Fraser University, Canada. He delivered a lecture on "Computational Anatomy – Tools for mapping brain structure and Applications to Differential Discrimination in Dementia."

Dr. Sudesh K Srivastav, Fulbright Scholar, Institute of Bioinformatics and Applied Biotechnology, Bangalore and Professor, Department of Biostatistics and Bioinformatics, Tulane University, New Orleans, LA . He delivered a lecture on "On Identification of Differential Expressed Genes Using a New Variance Estimator."

Dr. Tommy Sopwith, Managing Director, Bio Creation India Pvt Ltd (BCi), Science Technology Park, University of Pune. He delivered a lecture on "Commercialisation of BioScience Research in India."

Dr. Jaigeeth Deveryshetty, Alumnus, Research Fellow in Asso. Prof. Helen Blanchard's group, Institute for Glycomics, Griffith University, Gold Coast, Queensland, Australia. He delivered a lecture on "Assessment of the Influence of Key Amino Acids on Rotavirus VP8* sialic acid binding."

Dhananjay Tambe, Department of Environmental Health, Harvard University. He delivered a lecture on "Collective Cell Guidance by Cooperative Intercellular Forces."

Prof. Ross Barnard, Director, Biotechnology Program, School of Chemistry & Molecular Biosciences, The University of Queensland Brisbane, Australia. He delivered a lecture on "Adventures in Diagnostics and Antibody Engineering."

Sharmistha Majumdar, Ph.D., Postdoctoral Scholar, Dept. of Molecular and Cell Biology, University of California, Berkeley, CA. She delivered a lecture on "The Evolution of a transposase: why some genes jump?"

David A. Sanders, Associate Professor, Markey Center for Structural Biology, Department of Biological Sciences, Purdue University, West Lafayette, IN. He delivered a lecture on "Surviving Starvation-Lessons from a Processive Exopolyphosphatase."

Dr. Prashant Kodgire, Alumnus, Department of Molecular Genetics, and Cell Biology, University of Chicago, Chicago, United States. He delivered a lecture on "Chromatin, Transcription and Somatic Hypermutation of Immunoglobulin Genes."

Bhaskar Saha, Institut de Physiologie et Biologie Cellulaires,Poitiers, France. He delivered a lecture on "Neural Stem Cells: Present and Future in Brain Injury Repair."

Soumen Kanti Manna, Visiting Fellow, Laboratory of Metabolism, Center for Cancer Research, NCI/NIH, Bethesda, MD. He delivered a lecture on "Metabolomics: Bridging the Gap between Fundamental and Translational Chemical Biology."

Dr. Sudeep Basu, Alumnus, Consultant & Global Practice Leader, Innovation Services, Frost & Sullivan, US. He delivered a lecture on "Intellectual Property in Innovation and its Impact on industries."

Anil Shanker, PhD, Assistant Professor, of Biochemistry and Cancer Biology Member, Vanderbilt-Ingram Cancer Center, Vanderbilt University Member, Meharry-Vanderbilt-Tennessee State University Cancer Partnership, USA. He delivered a lecture on "Enhancing Cancer Immunotherapy by Stimulationg Notch 1 and Death Receptor Signalling".

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

Balaji, P. B.
Seminar on "Annotating Hypothetical Proteins: a Case Study" at the *DBT-sponsored Bioinformatics workshop* held at the Advanced Centre for Treatment, Research and Education in Cancer, Khargar, Navi Mumbai on 8th February 2012

Balaji, P. B.
Seminar on "Energetics of Stacking Interactions in Carbohydrate-binding Sites" at a symposium on *Accelerating Biology 2012: Computing to Decipher, held at C-DAC*, Pune on 16th February 2012.

Banerjee, R.
Seminar on "Nanotechnology platforms for drug delivery", at the *Indo-US Symposium on Frontiers of Medicinal Chemistry and Drug Discovery with the theme Molecules to Medicines*, April 2011

Kumar, A.
Indo-Swiss Symposium on Recent Trends in NMR of Biomolecules, held during 23-25 January 2012, at NCL, Pune.

Participated in *Symposium on New Developments in NMR and Conference of National Magnetic Resonance Society*, held during February 5-8, 2012, at IISc Bangalore.

Ramalingaswamy Conclave, held during 11-13 March 2012, at Ramoji Film City, Hyderabad.

Manchanda, R.
Paper on "Computational Studies on Excitability: Central and Peripheral", IUSSTF *Indo-US workshop on Modelling Electrical Activity in Physiological Systems*, at Agra, March 5-9, 2012.

Paper on "Ion Channel Modulation of Neuron Excitability: Subtle Changes, Wide Effects" at *Syngene International Symposium on Current Trends in Ion Channel Biology*, held during Sept 2011, at Bangalore.

Seminar on "*Electrochemical Phenomena in Neurophysiology*", *DST Workshop on Electro-chemistry*, May 2011.

Satija, J., Mukherji, S.
Paper "Dendrimeric Nano-glue Material for Localized Surface Plasmon Resonance Based Fiber Optic Sensors," *ICANN 2011*, held during Dec 8-10, 2011, at IIT Guwahati.

Agnihotri, S., Mukherji, S., Mukherji, S.
Poster on "Evaluation of Chitosan-PVA Hydrogel as a Nanoreactor and Immobilization Matrix for Silver Nanoparticles," *ICANN 2011*, held during Dec 8-10, 2011, at IIT Guwahati.

Bharadwaj, R., Mukherji, S., Mukherji, S.
Poster on "Fiber optic sensor using L-Cysteine functionalized Gold Nanoparticles for trace detection of Trinitrotoluene (TNT)," *ICONSAT 2012* held during January 20-23, 2012 at Hyderabad.

Anvekar, V., Satija, J., Bharadwaj, R., Tharion, J., Mukherji, S.
Poster on "Surface Modification of Cetyl Trimethylammonium Bromide Capped Gold Nanorods Using Dendrimer," *ICONSAT 2012* held during January 20-23, 2012 at Hyderabad, India.

Agnihotri, S., Mukherji, S., Mukherji, S.
Poster on "Synthesis and Characterization of Silver Nanoparticle Immobilized on Glass Fibers for Antimicrobial Applications," *ICONSAT 2012* held during January 20-23, 2012 at Hyderabad, India.

Panda, D.
Seminar on "Tubulin acetylation stabilizes microtubule dynamics and influences chromosome segregation: Implications in cancer chemotherapy," *Life Science Symposium in Bhabha Atomic Research Centre*, Mumbai, October 2011.

"Stabilization of microtubule dynamic instability perturbs EB1 localization and inhibits migration of MDA-MB-231 cells," *35th All India Cell Biology Conference*, in Institute of Life Sciences, Bhubaneshwar, December 2011.

Seminar on "Bacterial Cytoskeleton: An attractive target for a new class of antibacterial drugs," *National Seminar on Biotechnology for Sustainable Development,* in Heritage Institute of Technology, Kolkata, February 2012.

Bhattacharya, A., Jindal, B., Singh, P., Datta, A., Panda, D.
Poster on "Plumbagin inhibits cytokinesis in *Bacillus subtilis* by inhibiting FtsZ assembly: A mechanistic study of its antibacterial activity", *Anti-infective Drug Discovery India 2012: The Fight Against Emerging Infections and Drug Resistance*, held during Mar. 20-21, 2012, at Hyderabad, India.

Seminar on "Inhibitors of bacterial cell partitioning: A New Paradigm for antibacterial drugs," *Anti-infective Drug Discovery India 2012: The Fight Against Emerging Infections and Drug Resistance*, in Hyderabad, March 2012.

Chaudhari, R., Daily, J. P., Patankar, S.
Paper on "*Plasmodium falciparum* Glutathione peroxidase: sub-cellular localization, Trafficking and Role in Anti-oxidant Networks," *DAE-BRNS Life Sciences Symposium-2011*, at BARC, Mumbai.

Patankar, S.
"MEDCHEM 2011," IIT Madras, Chennai, Oct. 28-29, 2011.

Patankar, S.
NIPER-CDRI Symposium on *Medicinal Chemistry and Pharmaceutical Sciences*, Central Drug Research Institute, Lucknow, Feb. 23-25, 2012.

Padinhateeri, R.
Seminar on "Nucleosome Dynamics" at the *Interdisciplinary Approach to Soft-matter & biological physics meeting* held in IACS/SINP, Kolkata, Dec 2011.

Phale, P. S.
Indo-Finish workshop held during 27-28 Nov 2011 at NEERI, Nagpur.

Guha Research Conference held during 1-5 Dec 2011.

Srivastava, S.
"Principles and Techniques in Proteomics & Analysis of Proteomics Data", *Workshop on Proteins to Proteomes: Bioinformatics Approaches (P2P)*, Bioinformatics Centre, held during December 16-19, 2011, at University of Pune, Pune, India.

"Evolving Solutions in Protein Interaction Analysis", *Evolutions 2011,* GE Healthcare Life Sciences, Mumbai, Dec 2011.

Joshi, N., Thanigaivel S., Balakrishnan, B., Banerjee, R.
Poster on "Self cross linking lipopolymeric nanocapsules with surface grafted drugs for combination chemotherapy", *International Conference on Nano science and Technology ICONSAT 2012* held during January 20-23, 2012 at Hyderabad. Won "Young Researcher Award."

Joshi, N., Thanigaivel S., Banerjee, R.
Poster on "Trigger Responsive, Lipid *nano eight S*tructures for Combination Chemotherapy". *4th Bangalore Nano International Conference* held during December 8-9, 2012 at
Bangalore

Poster on "Multi Sensitive and pharmacologically active lipid nanovesicles for Synergistic Chemotherapy with Encapsulated Paclitaxel". *Gordon Research Conferences (Cancer Nanotechnology: From Basic Concepts to Clinical Applications)* during July 17-22, 2011, at Colby

Nagare, G., Mukherji, S.
Paper on "Fabrication of GMRF Structure on Glass Substrates by Direct Electron Beam Lithography", *219th ECS Meeting Montreal*, held during May 1-6, 2011, at QC, Canada.

Nagare, G., Mitra, S., Mukherji S.
Paper on "Photonic Crystal Based Biosensor with Inbuilt Nanofluidic Channels", *219th ECS Meeting Montreal,* held during May 1-6, 2011, at QC, Canada.

Seena, V., Patil, S., Mukherji, S., Rao, V., Mukherji, S.
Paper on "Sensor Systems for Healthcare & Homeland Security", *219th ECS Meeting Montreal,* held during May 1-6, 2011, at QC, Canada.

Asthana, J., Mohan, R., Panda, D.
Poster on "Inhibition of HDAC6, a Microtubule Deacetylase, increases microtubule stability", *51st Annual Meeting of American Society for Cell Biology*, held during Dec. 03-07, 2011, at Denver, Colorado, USA.

Rai, A., Panda, D.
Poster on "DRB Perturbed the interaction between Casein Kinase 2 and microtubules, depolymerized microtubules and induced apoptosis in MCF-7 Cells", *51st Annual Meeting of American Society for Cell Biology*, held during Dec. 03-07, 2011, at Denver, Colorado, USA.

Poster on "GTP Influences the Inhibitory Effects of MciZ on FtsZ Assembly", *25th Anniversary symposium of the Protein society*, held during Jul. 23-27, 2011, at Boston, MA, USA.

Jindal, B., Balaji, P.V., Panda D.
Poster on "Mechanism of Regulation of FtsZ Assembly by UgtP", *ASBMB Annual Meeting*, held during Apr. 09-13, 2011, at Washington, D.C., USA.

Padinhateeri, R.
Paper on "Dynamics of cytoskeletal filaments," *International Conference on Mathematical and Theoretical Biology,* held during Jan. 23-27, 2012, at Pune.

Patankar, S.
Seminar on "Dynamics of amyloidogenic peptide oligomers" at the *Moscow Conference on Computational and Molecular Biology 2011* held at the Moscow State University, Moscow, Russia from 19th to 26th July, 2011

Chakrabarti, R., Patankar, S., Coppel R. L., Cooke, B. M.
"Understanding microtubule function and Dynamics in *Babesia* Parasites," *Australian Society for Parasitology (ASP) Annual Conference, 2011*, at Queensland, Australia.

Sen, S.
Paper on "Interplay of substrate properties and Cell-substrate Adhesions in De-adhesion Dynamics," *International Conference on Mathematical and Theoretical Biology,* held during Jan. 23-27, 2012, at Pune.

Ray, S., Srivastava, S.
Poster on "Serum proteome analysis of Falciparum and vivax malaria to decipher disease pathogenesis, host immune response and identify surrogate protein markers", *United States Human Proteome Organization* held during March 4-7, 2012 at San Francisco, California.

Srivastava, S.
Seminar on "Pharmacoproteomics as a Complement to Pharmacogenomics: Systems level tools to Assess the functional consequences of genetic isoforms", *Frontiers of Medical Sciences* held during November 17–18, 2011, at Changsha, China.

Paper on "Proteomics to decipher human response against Falciparum and Vivax Malaria" *International Conference on Technological Challenges in Developing Affordable In-Vitro Molecular Diagnostics* held during March 11-14, 2012 at Navi Mumbai.

Srivastava, S., Golapalli, K., Ray, S.
Paper on "Investigation of human serum proteome alterations in glioblastoma multiforme", *International Symposium on 'Cancer Genomics and its Impact in the Clinics'* held during January 26 – 29, 2012 at ACTREC, Navi Mumbai.

Invited Lectures

Balaji, P. B.
"Exploring Protein Glycosylation Pathways in Prokaryotes using Bioinformatics" at the *Graduate Students Meet 2011* held at the Advanced Centre for Treatment, Research and Education in Cancer, Khargar, Navi Mumbai on 9th December 2011.

Banerjee, R.
"Nanomedicine" Plenary Lecture at *National Science Congress*, January 2011.

Kondabagil, K.
CEP course "*Bacteriophage: Potential for application in Wastewater Treatment Processes*" , "Biology in Pollution Mitigation" sponsored by Central Pollution Control Board, Feb 13-15, 2012.

Manchanda, R.
"IIT-Bombay and its 'Publics,": Along the Decades. *Alumni Association Meet*, IIT-Bombay, August 2011.

Panda, D.
"Inhibition of microtubule dynamics blocks mitosis and retards cell migration: Implications for cancer chemotherapy," Indian Institute of Science Education and Research, Thiruvananthapuram, December 2011.

Patankar, S.
"The Role of Technology in Crime and Crime Prevention" CEP Courses for *Senior Indian Police Service Officers*, Nov 2011

Punekar, N.
"History of enzyme catalysis: A century of Chemistry-Biology Interface". *UGC Sponsored Event/ Conference on Mile Stones of Chemistry in the last hundred years* held on September 10, 2011; at Department of Chemistry, KLE's S. Nijalingappa College, Bangalore.

"History of enzyme catalysis: A century of Chemistry-Biology Interface," jointly organised by Maharashtra Academy of Sciences (MASc) and NCL delivered on October 12, 2011, at Biochemical Sciences Division lecture hall National Chemical Laboratory, Pune.

Srivastava, S.
"High throughput proteomics for biomarker discovery and Protein-protein Interactions," King Edward Memorial Hospital and Seth GS Medical College, Valedictory function (May 2011).

Mukherji, S.
"Optical Biosensors" at National Cheng-Kung University, Tainan, Taiwan November, 2012.

Padinhateeri, R.
"Nucleosome Positioning in a Model of active chromatin remodeling enzymes," *Physico-Chimie Theorique*, at ESPCI, Paris, France, June 2011

Srivastava, S.
"Proteomics - From Bench to Clinic", at Monash University, Australia, March 2012.

"Proteomic Approach to unravel host response in Malaria", at Monash University, Australia, March 2012.

Award/ Distinctions

Bhaumik, P.
Ramalingaswami Re-entry Fellowship of the Department of Biotechnology for the year 2011-2012.

Joshi, N.
Research Scholar selected as TR35 Young Innovator under 35 by MIT for developing "Double loop lipid nanostructures aerosols for Non-invasive combination chemotherapy for lung cancer", 2012.

Manchanda, R.
Tibor Jones South Asia Prize for fiction, 2012.

Sen, S.
BRNS Young Scientist Award, 2011.

Srivastava, S.
Deputy Editor-in-Chief - Current Pharmacogenomics and Personalized Medicine (2012)

Expert Panel member of the WHO project, Grand Challenges in Genomics for Public Health in Developing Countries (2011)

Organizing committee member of conference on Frontiers of Medical Sciences, China (2011)
ACS certificate of appreciation for ACS publications peer-review.

Listed in Marquis Who's Who in medicine and healthcare 2011-2012 (8th Edition)

Honorary Work

Banerjee, R.
Associate Editor, J of Biomaterials and Tissue Engineering, Am Sc. Publishers; Served as Editorial Board Member of Drug Delivery and Translational Research, Springer Verlag; and Engineering and Technology, Inventi Journals; World Journal of Respirology; NanoTrends, India; International Journal of Life Sciences, Biotechnology and Pharmaceutical Research; International Journal of Pharma Medicine and Biological Sciences; Biomaterials and Biodevices; Trends in Biomaterials & Artificial Organs; and as Senior Editor (International), Chinese Journal of Clinicians; Editorial Board Member and Chair of Nanobiotechnology, Computational and Structural Biotechnology Journal;

Invited Member for Task Force on Materials Science, International Programs, DST ; and as Reviewer, Grants for DBT, DAE, IUSSTF, Indo-German, Indo-French Proposals

Phale, P. S.
Served as Editor, Indian Jr of Microbiology, GATE and JAM activity; Reviewer for several national and international journals; and Reviewer/Examiner for Ph D thesis, research proposals from Govt. funding agencies.

Manchanda, R.
Served as Member, DBT Task force in Neurosciences; NBRC Scientific Assessment Committee; and NBRC Board of Studies

Sen, S.
Reviewed papers for international journals – Advanced Biomaterials (Sep 2011), International J. Cell Biology (Feb 2012); and reviewed book chapter for the book "Atomic Force Microscopy in Liquid" (May 2011).

Srivastava, S.
Reviewed papers for international journals – Current Pharmacogenomics and Personalized Medicine (Feb 2012), Expert Review of Proteomics (Feb 2012), Journal of Proteomics (Nov 2011), Journal of Proteomics

(Oct 2011), Indian Journal of Experimental Biology (Sep 2011), Plos ONE (July 2011), International Journal of Biotechnology Applications (June 2011), Recent Patents on Nanomedicine (June 2011), ACS Nano (June 2011), Talanta (June 2011), Phyisca E (May 2011). Reviewer for grants submitted to Department of Biotechnology (DBT) Neuroscience, Department of Biotechnology (DBT) HGTF.

Faculty Members and their Specializations

Core Faculty

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

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

3. P. J. Bhat
Eucaryotic gene expression; yeast molecular genetics; eucaryotic transcriptional regulation.

4. R. Manchanda
Neuromuscular Physiology & Biophysics.

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

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

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

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.

17. Shamik Sen
Cell Mechanics & Mechanobiology, Tissue Engineering, Computational Modeling.

18. Ashutosh Kumar
Structural Biology, Biomolecular NMR Spectroscopy.

19. Kiran Kondabagil
Mechanisms of assembly of large DNA viruses, virus engineering: viral nano-containers for targeted delivery.

20. Prasenjit Bhaumik
Understanding the structure function relationship of enzymes and biological macromolecules. Protein crystallography, Structure based antimalarial drug development, Structural enzymology.

21. Prakriti Tayalia
Cellular programming, Tissue engineering, Immunotherapy, Biomaterials, Microfabrication.

Associated Faculty

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

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

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

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

5. K. V. Venkatesh
Biochemical and food engineering.

6. P. Wangikar
Biothermodynamics; Biophysical Chemistry.

7. S. Chaudhari
Medical Image & Signal Analysis.

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

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

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

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

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

13. Nand Kishore
Biothermodynamics; Biophysical Chemistry.

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

15. Anil Kumar
Bio Polymers.

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

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

18. A. K. Singh
Bioorganic chemistry; Photoreceptor membrane proteins; Photochemistry and photobiology.

19. Sumathi Suresh
Remediation of pesticides using biological & chemical methods. Biological treatment for removal of textile dyes, biodegradactose of hydroxybenzatoite and phthalates.

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

21. G. G. Ray
Ergonomics.

Distinguished Guest Professor

1. G. Padmanaban
Malaria research.

2. Dr. Hartmut Michel, Noble Laureate
Photosynthesis research.

Adjunct Faculty

1. Dr. Vivek Soni
Biomaterials & Artificial Organs.

2. Dr. Yash Lokandwala
Cardiovascular Physiology.

3. S. Arunkumar
Computers in Biology and Medicine, Telemedicine, Intelligent systems and pattern recognition approaches to the analysis of medical and biological data.

Alumni Visiting Professor

1. Nitish V Thakor
Medical Instrumentation, Neuroengineering, Neural Signal Processing, Devices, Microsystems and Prostheses

Chemical Engineering

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 specialisations. 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 increase in the research activity of the department. The department received good funding for sponsored projects this year. The total number of publications this year in international journals is around 98. There are 34 faculty members in the department.

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

Academic Programmes

Degrees Awarded		
B.Tech.	:	67
Dual Degree (B.Tech., M.Tech.)	:	24
M.Tech.	:	34
M.S. (by Research)	:	00
Ph.D.	:	12

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.

Sponsored Research Projects	
New	: 22
Ongoing	: 78
Completed	: 10

Project Title	Agency Name	Project Status
Synthesis and Use of Nanoparticles for Innovative Water Treatment Technologies	An Autonomous Research & Developement Centre of DST, Govt. of India.	Ongoing
CFD modeling and simulation of chemical vapor deposition reactor for production of high purity silicon ingots	Board of Research in Nuclear Sciences	Ongoing
Systems Biology of Protein Secretion in Recombinant Mammalian Cell lines.	Deptt of Biotechnology	Ongoing
Engineering a Novel Bioreactor and Cell Sorter for Pluripotent Stem Cell Culture	Deptt of Biotechnology	Ongoing
DBT Committee visit for Project Proposal Titled : Nano Composite hollow fiber membranes and biomaterials for hemodialysis and reconstructive medicine	Deptt of Biotechnology	Ongoing
Bioprospecting for Alcoholdehydrogenases for Chiral Synthesis	Deptt of Biotechnology	Ongoing
Multivariable Control Scheme for Gas Turbines using the Model Predictive Control Strategy	Defence Research & Development Organisation	Ongoing
Review Meeting of IRHPA project of Chemical Engineering	Department of Science & Technology	Ongoing
BIOACTIVITY STUDIES OF BHASMAS	Department of Science & Technology	Ongoing
Nanoparticles in Traditional Medicine may lead to New Medical Chemistry: A Study of Bhasmas Using Modern Sciences	Department of Science & Technology	Ongoing
Saltation and attrition of solid particles in pneumatic conveying systems	Department of Science & Technology	Ongoing
SERC School on Introduction to Systems and Sythetic Biology for Scientists and Engineers	Department of Science & Technology	Ongoing
WOS-A “Genomic scale modeling of gene regulatory networks cross-linking metabolic and signaling pathways for a spexified phenotype”	Department of Science & Technology	Ongoing
Study of Distribution of Counter-ions around ionic Micelles using SANS and SAXS	Department of Science & Technology	Ongoing
Engineering Silver Nanoparticle Impregnated Activated Carbon for Water Purification	Department of Science & Technology	Ongoing
IITB-Centre of Excellence in Climate Studies (IITB-CECS)	Department of Science & Technology	Ongoing
Phase -II , Homeopathy : An Investigation Based on Concepts of Nanomedicine	Donation	Ongoing

Project Title	Agency Name	Project Status
IFCPAR Industrial Research Project No.7114-Air Pollution	Indo-French Centre for the Promotion of Advanced Research	Ongoing
FOSSEE: Free/Open Source Software in Science and Engineering Education (Assimilation of Open source Software in Science and Engineering)	Ministry of Human Resource Development	Ongoing
Transport and Rxn Engg RT Labs	Ministry of Human Resource Development	Ongoing
GNUKhata - Open source software	Ministry of Human Resource Development	Ongoing
Award of Post Doctoral Fellowship for Women for 2009-10/2010-11 (category -Gen)	University Grant Commission	Ongoing

Consultancy projects

The department undertook nine jobs generating Rs. Rs.2229563/- The total number of faculty involved was 06.

Extension Activities

Symposiums

Symposiums on "Research Scholars' Symposium 2012" and "Azeotropy 2011" were conducted during the year.

Visitors to the Department

There were many visitors to the department, and they delivered/gave lectures/seminars, as follows:

- Mr. Chandrashekar Shankar, CEO Vision Earthcare, SINE IITB, "Molecular Design of Materials-Application to Mechanical Properties of Network Polymers", 22 Mar 2012.
- Dr. Bala Raghunath, Director of Biomanufacturing Sciences Network for Asia, "Designing and Scaling a Robust Biopharmaceutical Manufacturing Process", 12 Mar 2012.
- Dr. Bala Raghunath, Director of Biomanufacturing Sciences Network for Asia, "Sizing of Robust & Cost Effective Filtration Processes Using Safety Factors", 12 Mar 2012.
- Dr. Amit Dutta, National Institute of Standards and Technology, 100 Bureau Drive, Gaithersburg, MD 20899, USA, "Macromolecules at Solid-Liquid Interfaces", 27 Feb 2012.
- Dr. Partha Sarathi Goswami, CSIR-Centre for Mathematical Modeling and Computer Simulation, Bangalore, "Particle Dynamics in a Turbulent Particle-gas Suspension at High Stokes Number", 16 Feb 2012.
- Dr. Saurav Datta, Research Engineer at Energy Systems Division,Argonne National
- Laboratory, USA, "Advanced Membrane Technologies – Experimental Study and Theoretical Analysis", 02 Feb 2012.
- Dr. Lopamudra Giri, Department of Anesthesiology, Washington University, School of Medicine, St Louis, "Emerging Topics at the Interface of Engineering and Biology", 30 Jan 2012.
- Rajesh N. Davé, Distinguished Professor of Chemical Biological and Pharmaceutical Engineering, NJIT Site-Leader, NSF-ERC on Structured Organic Particulate Systems New Jersey Institute of Technology, Newark, NJ, USA, "Particle Engineering for Pharmaceutical Applications", 27 Jan 20121
- Dr. Venkata Ramana Gundabala, Post-doctoral fellow at Georgia Institute of Technology, USA, "Microfluidics Routes to Droplet Generation and Cell Microencapsulation" 19 Jan 2012.
- Dr Aruna Mohan, "Field-Theoretic Modeling of Supramolecular Polymer Networks and Gels", 12 Jan 2012.

- Prof. David H. Gracias Johns, Johns Hopkins University, Baltimore, USA, "Three-Dimensional Self-Assembly at Small Size Scales", 13 Jan 2012.

- Dr. Jacob Eapen, Department of Nuclear Engineering, North Carolina State University, USA, "Classical Nature of Thermal Conduction in Nanofluids", 12 Jan 2012.

- Dr. Jagan Mahadevan, University of Tulsa, "Impact of Capillary-Driven liquid films on salt crystallization", 02 Jan 2012.

- Dr. Parag A. Deshpande, "Shifting the Metal-on-Dupport Paradigm to Metal-in-Support Paradigm: Novel Heterogeneous Catalysis by not-so-novel Compounds", 19 Dec 2011.

- Dr. Vipasha Soni, Senior Project Engineer, BASF SE, Germany, "Simultaneous Model-based Design of Process and Assisting Structured Materials", 1 Dec 2011.

- Prof. Mukta Tripathi, Department of Chemical Engineering, IIT Gandhinagar, "Phase Behavior of Anisotropic Colloids," 28 Nov 2011.

- Prof. Murray Gray, Department of Chemical and Materials Engineering, University of Alberta, Edmonton, Canada, "Development and Management of New Energy Supplies: Canada's Experience with Unconventional Energy Development", 11 Aug 2011.

- Prof. Murray Gray, Department of Chemical and Materials Engineering, University of Alberta, Edmonton, Canada, "Processing of Complex Nano-Structured Fluids: Fundamental Gaps in Engineering and Chemistry for Processing Heavy Petroleum Fractions", 15 Nov 2011.

- Dr Jyoti Seth, "Inhomogeneous Flow of Soft Particle Pastes & Use of Emulsions for Energy Efficient Combustion," 13 Sep 2011.

- Dr. Jyoti Phirani, University of Houston, Houston, "Methane Production from Hydrate Bearing Sediments", 21 Sep 2011

- Dr. Ashish Lele, Polymer Science and Engineering Division National Chemical Laboratory, "From Molecular Structure to Polymer Processing: Bridging length and time scales", 25 Aug 2011.

- Prof. Ashutosh Sharma, IIT Kanpur, "Self-organized Meso-Fabrication and Functionalities in Highly Confined Soft Materials", 17 Aug 2011.

- Dr. Anshu Anand, University of Colorado at Boulder, "Modeling and Simulation of Particulate Flow", August 10, 2011.

- Dr. Benno Lueke, Managing Director, UHDE India Private Limited, "Industrial Electrolysis of sodium chloride brine and HCl - Status and further developments," 4 Aug 2011.

- Arindam Sarkar's Talks thru Skype, Lawrence Berkeley National Laboratory, CA, "Electrochemical Oxygen Reduction on Non Platinum, Low Platinum and Non Noble Metal Electrocatalyst," 15 Jun 2011.

- Dr. Pratyush Dayal's Talk through Skype, Dr. Prankul Middha, GexCon AS, Bergen, Norway), "Modeling Active Self-oscillating Gels that Follow Complex Paths", 15 Jun 2011

- Dr. Prankul Middha's Talk through Skype, "The Use of CFD for Explosion Safety Studies on Process Facilities", 14 Jan 2011.

- Dr. Yogendra Shastri's Talk through Skype, Visiting Research Assistant Professor, Energy Biosciences Institute & Department of Agricultural and Biological Engineering University of Illinois at Urbana-Champaign, "Techno-Economic Feasibility Analysis of Bioenergy Feedstock Production using Opptimization and Simulation Models", 14 Jun 2011.

- Dr. Ethayaraja Mani, Van't Hoff Institute for Molecular Sciences, University of Amsterdam, The Netherlands, "Modeling of Self-assembling Colloids", 03 Jun 2011.

- Dr. K. S. Gandhi, IISc Bangalore, "Hopes & Fears for IITs: View from the Sidelines.", 06 April 2011.

- Dr. K. S. Gandhi, IISc Bangalore, "Nature vs. Nurture: Case of Problem Solving", 05 April 2011

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

A. K. Suresh
Young Investigators Meeting (YIM-2011), Cambridge, Massachussetts, USA. Oct 8-10, 2011.

Chandra Venkataraman
"Climate Footprint of Selected Indian Emission Sectors", *National Research Conference on Climate Change*, Indian Institute of Technology Delhi, November 5-6, 2011.

"Data Assimilation using Optimal Interpolation: Correcting Chemical Transport Model Predictions with Satellite Observations", *National Research Conference on Climate Change*, Indian Institute of Technology Delhi, November 5-6, 2011.

A Stakeholder Consultation Workshop on Brick Kiln Performance & Roadmap for Cleaner Brick

Manufacturing in India, Shakti Sustainable Energy Foundation, India Habitat Centre, New Delhi, September 9, 2011.

Kannan M Moudgalya
"LaTeX Training through Spoken Tutorials" in annual international event *TUG 2011* held on 21 October 2011 at Trivandrum.

"Spoken Tutorials For Employment, IT Literacy and Bridging Digital Divide" at the *International Conference on Technology Enhanced Education* held on 4 January 2012 at Amrita University, Kollam.

"Inclusive, Collaborative, Education through Spoken Tutorials" at the *International Conference on Emerging Green Technologies* held on 29 July 2011 at Periyar Maniammai University, Thanjavur.

Mahesh S Tirumkudulu
"Ultimate Strength of a Colloidal Packing Saturated with a Solven ", IUTAM Symposium on *Mobile Particulate Systems: Kinematics, Rheology and Complex Phenomena*, held from January 23 - 27, 2012, at Bangalore, India

Mani Bhushan
"Robust Reallocation and Upgrade of Sensor Networks for Fault Diagnosis", at the 21st *European Symposium on Computer Aided Process Engineering* - ESCAPE 21, Greece, May 2011.

Madhu Vinjamur
"A Simple Method to Optimize Drying Conditions in Multi-zone Dryers for Polymer Coatings," in *Asian Coating Workshop*, held July 4-5, 2011, at Fukuoka, Japan.

"Rate Constant of Homogeneous Acid Catalyzed Reactions is Re-defined using Taguchi approach," *Chemference*, Bangalore, India, September 23-24, 2011

"Taguchi Approach to Investigate the Rate Constant of Homogeneous Acid Catalyzed Reactions," *International Symposium on Relations between Homogeneous and Heterogeneous Catalysis*, Berlin, Germany, September 11-16, 2011

Pramod P Wangikar
ESF-EMBO Conference on Molecular Bioenergetics of Cyanobacteria: From Cell to Community held at Sant Feliu de Guixols, Spain during April 10-15, 2011 (http://www.esf.org/index.php?id=7180).

Workshop Cyanobacterial Metabolism: Models and Validation, held between Sunday, 26 June 2011 and Wednesday, 29 June 2011, at The Abbey Resort, 269 Fontana Blvd., Fontana, Wisconsin, 53125 USA

Indo-US Workshop on Biocomputing (ISB 2011) held at Calicut, India during September 12-13, 2011.

P. Sunthar
"Self-assembly of Vesicles in a Low Peclet Number Mixing of Phases: Experiments and Possible Mechanism", *National SERC Symposium on Complex Fluids*, 6—7 January 2012, at IIT Guwahati.

"Anamolous "Fingering in Vesicle Suspensions", in an *International IUTAM Symposium on Mobile Particulate Systems*, 23—27 January 2012, Bangalore.

Rochish Thaokar
Asia Pacific Chemical Engineering Congress, 21-24 February, 2012, Singapore IUTAM on Particulate matter, Jan 24-30, 2012, Bangalore

Complex Fluids Symposium, Jan 3-7, 2012, IIT Guwahati

Advanced Instabilitiy Methods, Jan 21-24, IIT Bombay

National Symposium on Fluid Mechanics and Fluid Power, 17-20 December, 2011, Bhopal

Rajdip Bandyopadhyaya
"Aqueous Dispersion of Magnetite Nanoparticles: Synthesis Mechanism, Cellular Uptake and State of Dispersion", *American Chemical Society's Colloid and Surface Science Symposium*, Montreal, June, 2011.

Sharad Bhartiya
"Online Batch Digester Monitoring & Control of Kappa Number in Indian Pulp & Paper Mills", *Workshop on Dissemination of Information on Issues Addressed under Cess Supported R & D Projects*, New Delhi, August 17, (2011)

V. M. Naik
Young Investigators Meeting (YIM-2011), Cambridge, Massachussetts, USA. Oct 8-10, 2011.

Vinay A. Juvekar
ISEAC International Symposium cum Workshop on Electrochemistry, Dec 7-10, 2011 , Goa, India

Jayesh Bellare
International Conference on Healthcare Infrastructure and Medical Technology 2011 on 2-5 February 2011 at Jawaharlal auditorium, AIIMS, New Delhi, India.

"Monash Academy Annual Symposium 2011" on 17-19 February 2011 at Victor Menezes Convention Center.

Conferences /Symposia/Workshops and Seminars (Coordinated/Chaired)

Jayesh Bellare
Chaired a session "Advance in Electron Microscopy in Virology research and 3D Imaging: The Road Ahead"

on 20-21 October 2011 at National Institute of Virology, Pune.

Invited Lectures

A. K. Suresh
"Understanding the Influence of Synthesis Conditions on Structure and Performance of TFC Membranes for RO", Dow Research, Midland, Michigan, USA, Oct 17, 2011.

"Reaction-transport Coupled Systems in Chemical Engineering", Dow Research, Midland, Ohio, USA, Oct 17, 2011.

"Thin Polymeric Films by Interfacial Polycondensation at Liquid-liquid and Polymer-liquid Interfaces: Experiments and Modelling". WUStL, St.Louis, MO, USA. Oct 14, 2011.

Chandra Venkataraman
"Aerosol Chemistry and Climate Effects in the South Asian Region," in *Workshop on Atmospheric Chemistry in South Asia: Progress and Emerging Issues*, Indian Institute of Science Education and Research Mohali (IISER), Mohali, Punjab, India, March 5-6, 2012

Devang V. Khakhar
"Challenges in Modeling Complex Flows", India Science Lab, GM Global R&D Symposium on *Modeling and Simulation Challenges in the Design and Development of Future Vehicles* Monday, Nov 14, 2011, Bangalore

"Chemical Engineering in the 21st Century", Seventh Champakbhai Choksey Endowment Lecture, Dwarkada J. Sanghvi College of Engineering, March 24, 2012

"Rheology and Segregation of Granular Mixtures in Dense Flows, Unifying Concepts in Materials", *J. A. Krumhansl Symposium*, 6-8 February, 2012, NCBS, Bangalore

Ganesh Viswanathan
"Hot Zone Formation and Dynamics in Catalytic Packed-bed Reactors", *2nd Indo-German Workshop on Recent Advances in Reaction and Separation Processes*, Bad Herrenhalb, Germany

"Pattern Formation in Catalytic Packed-bed Reactors", National Institute of Technology Trichy, Tiruchirapalli.

Jhumpa Adhikari
Lecture on "Molecular Simulation Techniques: NVE, NVT and NPT" in *Molecular Modelling Workshop* Schedule at ICT Mumbai on 29th January, 2012

Janaky Narayanan
"Physics Applied to Biology", Lecture at Workshop conducted for S.Y.B.Sc. students at Physics Dept., R.J.College, Mumbai

Jayesh Bellare
"International Symposium on the Safe use of Nanomaterials and Workshop on Nanomaterial Safety: Status, Procedures, Policy and Ethical Concerns," on 1-3 February 2011 at Indian Institute of Toxicology Research, Lucknow, India

"Nanotechnology-An Update" on 22 February 2011 at Mini Auditorium, Juhu Campus, S.N.D.T Women's University, Mumbai.

"Trends in Electron Microscopy in Frontier Science" on 24 March 2011 at Rabindra-Okakura Bhaban, Kolkata

"Reminiscence-2011 Alumni-Meet of Ex. M.D. (HOM) Students" on 23 April 2011 at Sonajirao Kshirsagar Homeopathy Medical College, BEED.

"Nanotechnology and its Applications" on 09 May 2011at BARC

"Nanotechnology: Homoeopathy Perspective" on 04 November 2011 at Bakson College, YMCA Auditorium, Greater Noida.

K. V. Venkatesh
Key note speaker at the *National Conference on Transcriptome 2012* held at College of Engineering and Technology, Jalgoan

Key note speaker at the *National Conference on Bioinformatic*s held at DY Patil Institute, New-Bombay.

Kannan M Moudgalya
"Education through Scalable, Collaborative FOSS Workshops" at the *WorldDidac India 2011, Global Education & Skill Summit,* held on 28 September 2011, Delhi

"Spoken Tutorials: A Collaborative Educational Technology for Inclusive Growth", *Collaboration for Inclusive Growth SEARCC 2011,* held on 12 December 2011, Delhi

"Spoken Tutorials: For Employment, IT Literacy and Bridging Digital Divide", *National Conference on Applications of Mathematics and Computer Science,* held on 10 Feb. 2012, Vaishnav College, Chennai.

Madhu Vinjamur
"How to coat thin films and Dry Them?" at Kyushu Institute of Technology, Kitakyushu, Japan, 6 July 2011.

"Drying of Single Layer and Two Layer Polymer Films and Optimization of Operating Conditions," at Asahi-Kasei Engineering Co., Mt. Fuji, Japan, 7 July 2011.

Rochish Thaokar
"Lectures on Electrohydrodynamics", *Complex Fluids Symposium*, IIT Guwahati, January 2012

"Instability of a Charged Drop, Advanced Instability Methods", IIT Bombay, January 2012

Drop Dielectrophoresis, Department of Chemical Engineering, IISc, Bangalore, March 2012

Rajdip Bandyopadhyaya
"Functional Nanoparticles by the Colloidal Route: Experiments, Mechanism, Modeling", C. V. Seshadri Memorial Lecture, IIT Kanpur, Nov, 2011.

"Structure, Dynamics and Functionality of Nanoparticles in Multiphase Systems", Mumbai-Pune soft matter meeting, National Chemical Laboratory, Pune, Dec, 2011.

"Nanoporous Materials for Catalysis by Soft and Hard Templates", *National Workshop on the Role of Materials in Catalysis*, IIT Madras, Dec, 2011

"Functional Nanoparticles and Nanoporous Materials by Self Assembly: Experiments, Mechanism and Modeling", *Chemistry of Functional Materials Meeting*, Goa, Aug, 2011.

Sharad Bhartiya
"Advanced Process Control: Trends and Perspectives" IIChE Seminar Series, Mumbai Chapter, Mumbai, March 16, (2012)

V. M. Naik
"Harnessing Interfacial Phenomena for Structuring and Functionalizing Foods" in *International Conference on Functional Dairy Foods,* organized by the National Dairy Research Institute, Karnal, and the Dairy Technology Society of India, 16-19th November 2011

"Historical Evolution of Electrochemistry" in SERC School of Electrochemical Systems, IIT Bombay, Mumbai, 16–28th May 2011

"Electrodynamic Manipulation of Electro-neutral Materials" in *Complex Fluids & Polymer Engg. Seminar Series*, National Chemical Laboratory, Pune, 21st July 2011

Vinay A. Juvekar
Key note speech at National Conference on Nanostructures and Nanomaterials, Department of Chemical Engineering, North Maharashtra University, Jalgaon on 28th March 2012

Significant Awards and Distinctions

Chandra Venkataraman
Institute Chair Professor, IIT Bombay

Convener, IDP in Climate Studies, IIT Bombay

Chair, Working Group on Black Carbon Source Influence and Atmospheric Impact, National Carbonaceous Aerosol Programme, Ministry of Environment and Forests

Devang V. Khakhar
J. C. Bose Fellowship

Jayesh Bellare
Elected Fellow of Electron Microscopy Society of India
Elected Fellow of Maharashtra Academy of Science

K. V. Venkatesh
HH Mathur Award from IIT Bombay for excellence in Applied Research, 2011.
Hetro-Drugs GS Laddha memorial Lecture, Chemcon 2011.

Mahesh S Tirumkudulu
Swaranjayanti Fellowship Award for the year 2010-2011

Honorary Work

A. K. Suresh
Reviewed papers for AIChE J, I&EC Research, Chem. Eng. Res. Des.

Chandra Venkataraman
Editorial Advisory Board, Tellus-B.
Reviewer for Aerosol Science and Technology, Journal of Geophysical Research and Journal of Atmospheric Chemistry.
Reviewer for DST-SERC proposal.

Devang V. Khakhar
Editorial Board Member, Advanced Powder Technology, Elsevier
Member, Science Advisory Council to the Prime Minister
Member, Governing Council, Indian Academy of Sciences
Member, Atomic Energy Regulatory Board
Member, Science and Engineering Research Board
Member, Governing Council, Indian National Academy of Engineering
Member, Governing Council, Indian National Science Academy

Ganesh Viswanathan
Reviewed manuscripts for a) Systems and Synthetic Biology, b) Combustion Science and Technology

Hemant Nanavati
Reviewed Article titled "SOLID STATE POLYMERIZATION (SSP)" for "Encyclopedia of Polymer Science and Technology", by S.N. Vouyiouka and C.D. Papaspyrides

Jayesh Bellare
On the Board of Directors of Haffkine Bio Pharmaceuticals
Vice-Chair of DBT Task Force on Bioengineering
Member, ICMR Task Force on Biomedicine Engineering
Member, DBT Task Force Nano Bio Technology
Member, SBIRI Technical Committee of the DBT

K. V. Venkatesh
Associate Editor, BMC Systems Biology
Reviewed for Biotechnology and Bioengineering, PLOS computational Biology, PLOS One.

Madhu Vinjamur
Reviewer for Powder Technology, Journal of Chemical Engg of Japan, Journal of Applied Polymer Science

Mahesh S Tirumkudulu
Reviewed manuscripts for Soft Matter Journal and Langmuir Journal

Mani Bhushan
Reviewed papers in journals such as Automatica, Industrial Engineering & Chemistry Research, Chemical Engineering Science, IEEE Systems, Man and Cybernetics

Pramod P Wangikar
Member of Editorial Board of "Biotechnology and Bioengineering"

Rochish Thaokar
Article Reviewer, Physics of Fluids

Sharad Bhartiya
Evaluated PhD Thesis titled " Modeling and simulation study of thermal stress induced eukaryotic heat shock response" by Dwivedi of Birla Institute of Technology, Mesra

Reviewed various articles for Journal of Process Control, BIotechnology Progress, Control Systems 2012, among others

Member IPC, Control Systems 2012, New Orleans, April 22-25, 2012

Sandip Roy
Reviewed four papers for Journal of Loss Prevention in Process Safety, Process Safety and Environmental Protection

Sarika Mehra
"Effect of Endoplasmic Reticulum Stress on Protein Productivity in Recombinant CHO Cells" at AIChE Annual Meeting in Minneapolis, MN on 16th Oct 2011.

A Systems Approach to Decipher Stress Response Networks In Mycobacteria " at AIChE Annual Meeting in Minneapolis, MN on 18th Oct 2011.

V. M. Naik
Member PAC-Chem Eng for SERC - DST
Member FIST-Expert Committee SERC – DST
Member RC CFTRI - MysoreOrganisers: Juvekar, VA; Contactor, A; Naik, VM Details: SERC School of Electrochemical Systems, IIT Bombay, Mumbai, 16 – 28th May 2011

Vinay A. Juvekar
Paper Review for ' Journal of Chemical &Engineering data', May 2011
Paper Review for ' Journal of Colloid and Interface Science, June 2011
Paper Review for ' Energy & Fuels', August 2011

Faculty Members and their specializations

1. Jhumpa Adhikari
Statistical Thermodynamics, Molecular Simulations

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

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

4. Sharad Bhartiya
Process Control, Modelling, Identification

5. Mani Bhushan
Process Safety Analysis, Process Control, Optimisation, Identification

6. S Ganeshan
Heat and Mass Transfer

7. Ravindra D. Gudi
Process Safety Analysis, Process Control, Optimisation, Identification, Biochemical Engineering

8. Sameer Jadhav
Surface Science, Computational Flow Modelling (CFD), Drug Delivery, Biomolecular Engineering

9. Vinay A. Juvekar
Surfactants, Separations, Rheology, Electro-hydrodynamics, Multiphase Reaction, Surface Science, Polymer Physics

10. Devang V. Khakhar
Surfactants, Rheology, Granular Flow, Reactor Modelling, Polymer Processing, Nano-composites, Drug Delivery

11. Sanjay. M. Mahajani
Separations, Computational Flow Modelling (CFD), Multiphase Reaction, Catalysis, Renewable Resources, Coal Gasification

12. Ranjan Kumar Malik
Separations, Modelling, Energy Integration

13. Anurag Mehra
Surfactants, Multiphase Reaction, Nanoparticles, Molecular Simulations, Food Engineering

14. Sarika Mehra
Systems Biology, Computational Biology, Biomolecular Engineering

15. Arun Sadashio Moharir
Separations, Reactor Modelling, Optimisation, Modelling, Pollution

16. Kannan M. Moudgalya
Process Control, Modelling

17. Mamata Mukhopadhyay
Separations, Food Engineering

18. V. M. Naik
Surfactants, Separations, Electrohydrodynamics, Colloids, Surface Science, Polymer Processing, Nanoparticles, Food Engineering

19. Hemant Nanavati
Statistical Themodynamics, Polymer Processing, Polymer Physics, Nano-composites, Molecular Simulations, Renewable Resources

20. Janaky Narayanan
Surfactants, Rheology, Surface Science, Microscopy

21. Santosh Noronha
Renewable Resources, Green Engineering, Systems Biology, Computational Biology, Biomolecular Engineering, Biochemical Engineering

22. Sachin C. Patwardhan
Process Control, Modelling, Identification

23. V Govardhana Rao
Separations, Rheology, Heat and Mass Transfer

24. Sandip Roy
Surfactants, Separations, Process Safety Analysis, Surface Science, Statistical Thermodynamics, Renewable Resources

25. Hariharan S. Shankar
Pollution, Biochemical Engineering

26. P. Sunthar
Surfactants, Granular Flow, Fluid Mechanics and Stability, Computational Flow Modelling (CFD), Polymer Physics, Drug Delivery

27. A. K. Suresh
Heat and Mass Transfer, Multiphase Reaction, Catalysis, Nanoparticles, Biochemical Engineering

28. Rochish M Thaokar
Surfactants, Electrohydrodynamics, Computational Flow Modelling (CFD), Colloids, Statistical Themodynamics, Nanoparticles, Drug Delivery

29. Mahesh S Tirumkudulu
Surfactants, Rheology, Computational Flow Modelling (CFD), Colloids, Coatings, Thin films, Surface Science, Drug Delivery

30. Chandra Venkataraman
Aerosols, Surface Science, Nanoparticles, Nano-composites, Drug Delivery, Renewable Resources, Pollution, Climate Change

31. K. V. Venkatesh
Food Engineering, Systems Biology, Biomolecular Engineering, Biochemical Engineering

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

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

34. Pramod Wangikar
Process Control, Modelling, Computational Biology, Biomolecular Engineering, Biochemical Engineering

Chemistry

Introduction

The Department of Chemistry comprises 32 faculty members with expertise in various areas of chemistry and allied subjects and 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.

The contribution of the members of the faculty has been recognized in the form of Vice Presidentship of Indian Society of Chemists and Biologists, Fellow of Indian Academy of Science and achievement of MRSI-Medal 2010. Many of them 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 the academic activity. Further, the faculty keeps abreast of the developments in the scientific world through visits and interactions with various research groups within country and abroad.

Academic Programme

The General Chemistry programme of the department consists of two theory and two 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 the 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 specialisations is available within the department. Faculty members of the department disseminate the outcome of research through research publications, seminars and through participation 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 lecturing 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.

Degrees Awarded:

M.Sc.:	5-yr. Int. programme	:	09
	2-yr. M.Sc. programme	:	19
Ph.D.		:	25

R & D Activities

The faculty of the department 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 number of 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 departments 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.

Main areas of R&D Activity

The main areas of R&D activity of the department are: Biophysical Chemistry, Coordination Chemistry, Bio-inorganic Chemistry, Organometallic Chemistry, Bio-organic Chemistry, Chemistry of Natural Products, Synthetic Organic Chemistry, Photochemistry and Spectroscopy, Polymer Chemistry, Thermodynamics, Electrochemistry, Solid state Chemistry and Physics, Catalysis, and Theoretical Chemistry.

Sponsored Research Projects

The sponsored research projects undertaken by the department are as follows :

Sponsored Projects:	**: 114**
New Projects	: 21
Ongoing Projects	: 93
Completed	: 09
Faculty involved	**: 32**

New Projects

"Studies on Mechanism and Stereoselectivity in Transition Metal Catalyzed C-N Bond Formation Reactions" by Board of research in Nuclear Sciences.

"Metal-Catalyzed Synthesis of Heterocyclic Compounds" by Board of research in Nuclear Sciences.

"Investigation of the Physical Chemistry of Growth in Green Plants: A Theoratical Approach" by Council of Scientific and Industrial Research.

"Ferrocynyl-Phosponites-Phosphonites and Amino-phosphines Synthesis, Reactivity and , Catalytic Investigations" by Council of Scientific and Industrial Research.

"CSIR Junior Research Fellowship" in r/o Mr. Arghya Deb by Council of Scientific and Industrial Research.

"CSIR -UGC Junior Research Fellowship" in r/o Anamitra Chatterjee (Roll No.122556) by Council of Scientific and Industrial Research.

"CSIR UGC Junior Research Fellowship" in r/o Tuhin Patra (Roll No. 124735) by Council of Scientific and Industrial Research.

"Metal Mediated C-H Functionalization and Synthesis of Novel Compounds" by Council of Scientific and Industrial Research.

"Functional Boron-Dipyrromethenses: Building Blocks for the Synthesis of Novel Photo-and Redox-Active Systems" by council of scientific and industrial research.

"Senior Research Associateship" under CSIR the Scientists Pool Scheme of CSIR for Dr(Mrs) Vaishali Vinayak Samant by Council of Scientific and Industrial Research.

"Centre of Excellence in Nanoelectronics - Phase -II a Joint Project between IIsc,Bangalore & IIT Bombay" by Department of Information Technology.

"Interactive workshop at IIT Mumbai on High Performance Computing in India: Present Challenges & Future Endeavours" during June, 2011 by Department of Science & Technology.

"Synthesis of Metal Carbonyl based Organometallic Clusters (specially Fe containing) and their Catalytic Applications in Organic Transformations" by Department of Science & Technology

"Development and Characterization of Tin-Chalcogenide Thin Films and Nanostructures" by Department of Science & Technology.

"New Generation Molecular Magnetic Materials: Experiment and Theory" by Department of Science & Technology.

"Support to Top Chemistry Department in the International of Chemistry" by Department of Science & Technology.

"Designing chiral N/O-functionalized N-Heterocyclic Carbenes for Metal Mediated Catalytic Applications" by Department of Science & Technology.

"Bioinspired Catalysis: C-H Functionalization by Active Metal Species" by Department of Science & Technology.

"Studies of Iron complexes of N/O-functionlaized N-Heterocyclic carbenes in Homogeneous Catalysis" by Indo-French Centre for the Promotion of Advanced Research.

"Development of Carbon Nanotube-metal Hybrid Catalysts" by Indo-French Centre for the Promotion of Advanced Research.

"RDF Share of Project Investigators & Co-PI's involved in NANO Phase -II (11DIT005)" by Ircc - Dit OH.

"Investigation of the Physical Chemistry of Growth in Green Plants A Theoretical Approach" by CSIR

"Center for Excellence in Nanoelectronic Phase II" by MCIT

"National Center for Photovoltaic Education and Research" by MNRE

"New Generation Molecular Magnetic Materials: Experiment and Theory" by DST-AISRF

"Design of lanthanide-based Single-molecule-magents and Validation through Experimental Studies" by DST

Ongoing projects

"Role of Intramolecular Coordination in Isolation of Novel Organochalcogen and Organomercury Compounds; Selenenium cations, Telluroxanes, and Metallamacrocycles" by DST

"Synthesis and Characterization of L-Tellurocysteine and Related Derivatives" by DST

"Development and Characterization of Tin-Chalcogenide Thin Films and Nanostructures" by DST

"Cyclopalladated and -cuprated Organochalcogen Catalysts" by IRCC, IIT Bombay

"Theoretical Investigation of Magnetism in Molecules, Molecular Magnets, and Magnetic Materials" by DST

"Experimental and computational studies of the conjugates of calyxarenes as receptors towards ions and molecules including those of lanthanides and actinides: Establishing the structural features of the species of recognition by *ab initio* methods including density functional theory" by DAE, BRNS

"Study of protein-carbohydrate interactions using model molecular systems as a first step of entry into glycobiology: Synthesis and characterization of oligopeptides and glycoconjugates, and experimental & computational studies of the resultant species of interaction" by CSIR

"Inorganic-Protein Hybrids(IPH): Metallation of protein to generate metalloenzymes and novel materials using albumins and lectins" by DST

"A Lab on Chip of Cardiac Diagnostics", by ADA

"Development of Hand Held Portable Device for the Detection of Explosives using Amplified Fluorescent Polymers" by ADA

"Synthesis and Scale up of High Contrast Processable Electrochromic Polymers based on Conjugated Dialkoxyhiophenes" by DST

"Stereoselective and Atom Efficient Synthesis of Multi-functional and Bioactive Molecules via Morita-Baylis-Hilliman and Rauhut- Currier Reactions of Conjugated Nitroalkenes" by DST

"Cyclodiophosphazanes as Building Blocks to Design early-late Metal Heterobimetallics" by DST

"Ferrocenyl Phosphonites, Phosphinites and Aminophosphines: Synthesis, Reactivity and, Catalytic and Biological Investigations" by CSIR

"Studies on the Interactions of Amino Carboxylic Acids and Phosphonic Acids towards Alkaline Earth Metal Cations" by CSIR

"Organo and Metal-organosupramolecular Assemblies based on 1,3,5-Triarylbenzenes" by DST

"DAE-SRC Project on Porous Solids through Rational Synthesis" by DAE

"AMAT project on High-k Metal Precursors Chemistry" by AMAT, USA

"New Strategies for the Synthesis of Natural Products and Natural Product like Molecules" by DST

"Design and Synthesis of Novel Sugar-Oxasteroid-Quinones as Non-Steroidal Dissociated Glucocorticoid Receptor (GR) Agonists for Rheumatoid Arthritis" by DST

"Diversity-Oriented Syntheses of Natural Products and Natural Product like Molecules" by Astrazenecca Research Foundation

"Water and hydronium ion dynamics in polyelectrolyte membranes" by NRB

"Studies on Mechanism and Stereoselectivity in Transition Metal Catalyzed C-N Bond Formation Reactions" by BRNS (Mumbai)

"High Performance Computing in India: Present Challenges and Future Endeavors" by DST

"Designing Pyrazole Derived Pd Precatalysts for CC CrossCoupling Reactions" by BRNS

"Studies of Iron Complexes of N/O-Functionalized N-Heterocyclic Carbenes in Homogeneous Catalysis" by Indo-French project

"Designing Chiral N/O-functionalized N-heterocyclic Carbenes for Metal Mediated Catalytic Applications" by DST project

"Asymmetric Synthesis of Pyranonaphthoquinones through Dötz Annulation and Asymmetric Methods" by BRNS

"Development of Dimeric Fischer Carbenes: A Bidirectional Dötz Benzannulation Approach to Dimeric Pyranonaphthoquinones" by DST

"Asymmetric Allylation of Carbonyl Derivatives through ▪-Allylpalladium: Synthesis of N-Heterocycles" by CSIR

"Synthesis and Biochemical Evaluation of Chemically Modified RNA Cleaving 10-23 & 8-17 DNA Enzymes" by DST

"In Vitro Selection, Biochemical Characterization and Medicinal Chemistry of Novel RNA Cleaving Reduced Metal Ion Dependent DNA Enzymes" by DST & Max Plank Society (Germany)

"Computational approach to {3d-4f} Molecular-Nano-Magnets" by DST

Completed projects

"Amplification of Chirality and Autocatalysis in the Asymmetric Synthesis of Aminophosphonates" by DAE

"Synthesis and Biophysical studies of G-quadruplex DNA Stabilizing Agents Based on 1,8- Naphthyridine" by CSIR

"Development of Anti-malarial Therapeutics Based on Chemically Modified Small Interfering RNAs" by DBT

Consultancy Projects

During the year nine consultancy projects involving six faculty members were undertaken generating an income of Rs. 38,69,328.

Patents

Information on the number of patent applications filed, granted, etc.

S. No.	Patent application filed	Granted
1	"Antiinflammatory Curcumin derivatives", I. N. N. Namboothiri, N. Ayyagari, D. Jose, *U.S. Pat. Appl.* **2011**, US 20110160276, A1 20110630; **In. Pat. Appl. PCT/IB2010/001337;**	*Ind. Pat. Appl.* 3024/MUM/2009
2	"Solvent Free Solid State Oxidative Polymerization for the synthesis of conjugated polymers" Anil Kumar, Anshu Kumar and Rekha Singh, **Indian Patent Application No 2997/MUM/2011**, **Filed on 24 October 2011**	
3	"Novel Process for the formation of polymeric thin films based on 3,4-alkylenedioxythiophene monomers via oxidative *in-situ* polymerization and the applications thereof in organic photovoltaics" Anil Kumar and Rekha Singh, **Indian Patent Application No 2581/MUM/2011, Filed on 13 September 2011.**	
4	"A novel process for the functionalisation of epoxy based resists" Anil Kumar **Indian Patent Application No 1972/Mum/2011, Filed on 8 July 2011.**	
5	"A process for preparing poly (3,4-alkylenedioxythiophene) derivatives" Anil Kumar and Anshu Kumar, **Indian Patent Application No 2977/Mum/2010, Filed on 26 October 2010.**	
6	"Process for synthesis of Tb doped ZnO nanoparticles for total control over the UV to green luminescence intensity ratio and the tunability of UV luminescence (UVL)", Sharma, A; Layek, A; **Chowdhury, A**; Kundu, T; Singh, B.P; Dhar, S; PCT Int. Appl. No. PCT/IB2011/001671, (2011)	
7	"Decarbonylation of Aldehydes", Modak, A.; Deb, A. and Maiti, D. **Application no. 3280/MUM/2011.**	

Extension Activities

An Indo-German symposium during September 27-29, 2011, a national symposium on new Horizon of Chemistry on October 4, 2011, an In-house a symposium on March 10, 2012, and the Dr. A.K.Lala Memorial Lecture on March 15, 2012, were conducted by the department during the year.

Visitors to the Department

Dr. Nagesh Palepu, visited the Department on 18.10.2011 and 13.2.2012 to institute the "Dr. Nagesh Palepu Chair Professorship".

Dr. Swati Manjari, Rensselaer Polytechnic Institute Troy, NY, USA. He delivered a lecture on "Thermodynamics of Solvation through Fluctuating Cavities in a Dielectric Continuum".

Prof. K.S. Viswanathan, Indira Gandhi Centre for Atomic Research Kalpakkam. He delivered a lecture on "Infrared Spectroscopy in Cryogenic Matrices Probing Molecular Conformatons and Weak Intermolecular Interactions".

Dr. P.R.Vasudeva Rao, Director, Chemistry Group, Indira Gandhi Centre for Atomic Research, Kalpakkam. He delivered a lecture on "Chemistry for Fast Reactors and Associated Fuel Cycle".

Dr. Brahmachary, University of California, Berkeley, Department of Chemistry. He delivered a lecture on "A combinational approach to chiral recognition : Design of small molecule selectors for chiral separations" and "HIV Entry Inhibitors".

Dr. Sankararaman, Head, Department of Chemistry, Indian Institute of Technology Madras, Chennai. He delivered a lecture on "H-1,2,3-Triazol-5-ylidene Ligands and their Pd(II) Complexes".

Dr. Prashant Jain, Assistant Professor, University of Illinois at Urbana-Champaign USA. He delivered a lecture on "Photons, Ions, and Defects on the Nanoscale".

Dr. Amit Paul, Department of Chemistry, University of North Carolina At Chapel Hill. He delivered a lecture on "Electrochemistry: from Fundamental Charge Transfer to Molecular Catalysis".

Dr. Sundararaju Baskar, University of Rennes, France. He delivered a lecture on "Multiple Facets of Catalysis: from sp3 C-H Bond Functionalization to Hydrogen Generation for Sustainable Process".

Dr. Prabodh Chobe, GM R & D, BASF, India. He delivered a lecture on "Career Opportunities for Chemistry Students in Indian Industry".

Dr. A. Biswas, University of Edinburgh. He delivered a lecture on "Success in Selective Catalysis for Organic Synthesis and Development of Drugs for Medicinal Chemistry".

Dr. Rahul Nandurdekar, NCI, Frederick, USA. He delivered a lecture on "NO Chemistry: Developing NO-donors for Therapeutic Benefit".

Prof. Eva Malmstrom Jansson, Vice President, Royal Institute of Technology (KTH), Sweden. He delivered a lecture on "Synthetic Polymers and Natural Fibers for Novel Materials: Research and Education at KTH Royal Institute of Technology, Sweden".

Dr. Sudhanshu Sharma, 1050 S. Stanley PI, APT 241, Tempe, AZ-85281, USA. He delivered a lecture on "Materials for Energy Environmental and Electrochemical Applications".

Prof. Roland A. Fischer, Chair of Inorganic Chemistry II, Ruhr University Bochum, Germany, & Visiting Professor at Dept. of Chemistry, IIT Bombay. He delivered a lecture on "Cu/ZnO Nanocatalysts for Liquid Phase Methanol Synthesis".

Prof. V. Chandrasekhar, Dept. of Chemistry, Indian Institute of Technology, Kanpur. Hedelivered a lecture on "Molecules and Materials : Bridging the Gap".

Prof. Chang Hee lee, Kangwon National University, South Korea. He delivered a lecture on "Oligopyrrolic Macrocycles: from Meso-alkylidenyl Porphyrinoids to FDDA Chemical Probes".

Dr. A. Ajayaghosh, NIIST, Trivandrum. He delivered a lecture on "π Gels with Diverse Architectures and Properties".

Dr. Hariprasad, Department of Medicinal Chemistry, University of Kansas, Kansas, USA. He delivered a lecture on "Carbohydrates and Nucleosides: versatile starting materials for the synthesis of biologically active compounds".

Dr. Vishal Rai, Assistant Professor, and Ramanujan Fellow, Department of Chemical Sciences, Indian Institute of Science Education and Research, IISER), Bhopal. He delivered a lecture on "Chemoselective Peptide Macrocyclization-enabled by Unprotected Amino Aldehydes".

Dr. Thayumanavan, University of Massachusetts, Amherst. He delivered a lecture on "Stimuli Responsive in Nanoscale Assemblies and Disassemblies".

Dr. Aditi Das, Assistant Professor, Department of Comparative Biosciences and Affiliate, Beckman Institute for Advanced Science & Technology, University of Illinios, Urbana-Champaign. He delivered a lecture on "Elucidating the Function of Membrane Proteins using Phospholipid Bilayer Nanodiscs".

Prof. Atul Parikh, Departments of Biomedical Engineering and of Chemical Engineering & Materials Science, University of California, Davis, USA. He delivered a lecture on "Toward Synthetic Biology of Membranes: Reconstituting Selected Membrane Processes".

Prof. Anil Kumar, Professor, Department of Chemistry, Professor & Head, Centre of Nanotechnology, Indian Institute of Technology Roorkee. He delivered a lecture on "Colloidal Approach to Nanotechnology".

Prof. Abhijit Patra, AvH fellow, Makromolecular Chemistry, University of Wuppertal, Germany. He delivered a lecture on "Nanostructures Based on Molecular and Macromolecular Assemblies: Fabrication and Optical Properties".

Dr. Subarna Banerjee, Research scientist at CVD Equipment Corporation, New York. She delivered a lecture on "Metal Oxide/oxynitride Nanotube Arrays towards Solar Light harvesting".

Dr. Tahei Tahara, Chief Scientist, Director of Molecular Spectroscopy Laboratory RIKEN, 2-1 Hirosawa, Wako 351-0198, Japan. He delivered a lecture on "Several New Challenges in Ultrafast Spectroscopy".

Dr. Viresh Rawal, University of Chicago. He delivered a lecture on "Studies Directed towards the Total Synthesis of the Welwitindolinone Alkalloids".

Dr. Partha Nandi, Dept. of Chemistry, Univ of California, Berkeley. He delivered a lecture on "Metals in Porous Oxides: A New Direction in Synthesis".

Dr. Viresh Rawal, University of Chicago. He delivered a lecture on "A Unified Strategy for the Synthesis of Pedrin, Mycalamides and Related Natural Products".

Prof. Indrapal Singh, Department of Chemistry, Indian Institute of Technology, Madras. He delivered a lecture on "Weinerb Amide based Building Blocks and Their Applications".

Dr. Shiela David, Department of Chemistry, University of California. She delivered a lecture on "Date to Repair: From Chemistry to Cancer".

Dr. Peter A. Beal, Department of Chemistry, University of California. He delivered a lecture on "Nucleic Acid Chemical Biology: Studies in RNA Interference and RNA Editing".

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

Singh H.B.

"Organochalcogen and Mercury Chemistry: Role of Intramolecular Secondary Interactions" at the *14th National Symposium in Chemistry,* held at NIIST Trivandrm, Feb 3-5th, 2012.

Anniversary General Meeting of INSA held at Tezpur University Dec 28-30, 2011.

"2, 6- Disusituted Arylchalchcogen Compounds: Facile synthesis of Chalcogen Heterocycles" at *Indo-European Symposium on frontiers in Chemistry*, November 10-12, 2011.

3rd Indo-German Symposium on Frontiers in Chemistry held at IIT Bombay September 27-28, 2011.

Kotha Sambasivarao

"Post-assembly Peptide Modification via Cross-enyne Metathesis, DielsAlder reaction and 1,3-dipolar Cycloadditions", S. Kotha, D. Goyal (*nèe* Bansal), *242nd American Chemical Society (ACS) National Meeting & Exposition,* Aug. 28Sept. 1, 2011, Denver, Colorado, USA.

"Synthesis of a Llibrary of Trizole-based Peptides and Study of their Biological Profile", S. Kotha, D. Goyal (nèe Bansal), *3rd Indo-German Symposium on Frontiers of Chemistry,* Department of Chemistry, IIT Bombay, Sept. 27-28, 2011.

"Synthesis of Biaryl Derivatives by using Cross-enyne Metathesis, DielsAlder Reaction, and Suzuki coupling as Key Steps", S. Kotha, S. Vittal, *3rd Indo-German Symposium on Frontiers of Chemistry,* Department of Chemistry, IIT Bombay, Sept. 27-28, 2011.

"Diversity Oriented Approach to Macrocyclic Cyclophane Derivatives by Suzuki-Miyaura Cross-coupling and Olefin Metathesis as Key Steps", S. Kotha, A. S. Chavan, *3rd Indo-German Symposium on Frontiers of Chemistry,* Department of Chemistry, IIT Bombay, Sept. 27-28, 2011.

"Synthesis of a Novel Fluoranthene-fused Conformationally Constrained α-Amino Acid Derivatives via Alkylation and Diels%Alder Reaction as Key Steps", S. Kotha, M. Meshram, *3rd Indo-German Symposium on Frontiers of Chemistry,* Department of Chemistry, IIT Bombay, Sept. 27-28, 2011.

"Diversity Oriented Approaches to Macrocyclic Cyclophane Derivatives by Suzuki-Miyaura coupling, Tandem Claisen Rearrangement and Olefin Metathesis as Key Steps", S. Kotha, A. S. Chavan, *New Horizons in Chemistry, Department of Chemistry,* IIT Bombay, Oct. 3-4, 2011.

"Synthesis of Novel Fluoranthene-fused Polycyclic Aromatics via Alkylation and Diels–Alder Reaction as Key Steps", S. Kotha, M. Meshram, *New Horizons in Chemistry,* Department of Chemistry, IIT Bombay, Oct. 3-4, 2011.

"Diversity Oriented Approach to Macrocyclic Paracyclophane Derivatives via Ring-closing Metathesis as a Key Step", S. Kotha, M. E. Shirbhate, *New Horizons in Chemistry,* Department of Chemistry, IIT Bombay, Oct. 3-4, 2011.

"Diversity Oriented Approach to Functionalized Crownphanes by Cross Enyne Metathesis and Diels–Alder reaction as Key Steps", S. Kotha, G. T. Waghule, *New Horizons in Chemistry,* Department of Chemistry, IIT Bombay, Oct. 3-4, 2011.

"Diversity Oriented Approach to Functionalized Crownphanes by Cross Enyne Metathesis and Diels–Alder reaction as Key Steps", S. Kotha, G. T. Waghule, *7th J-NOST Conference for Research Scholars,* IISER Mohali, December 15-18, 2011.

"Synthesis of Novel Fluoranthene-Fused Polycyclic Aromatics via Alkylation and Diels–Alder Reaction as Key Steps", S. Kotha, M. Meshram, *7th J-NOST Conference for Research Scholars,* IISER Mohali, December 15-18, 2011.

"Synthesis of [4.3.3] Propellane Derivatives Using Weiss-Cook Reaction, Fischer-Indole Cyclization and RCM as Key Steps", S. Kotha, A. K. Chinnam, *In-House Symposium-2012,* Department of Chemistry, IIT Bombay, March 10, 2012.

"Diversity Oriented Approach To Novel Spirocyclic compounds via Enyne-Metathesis, Diels-Alder And [2+2+2] Cycloaddition Reactions as Key Steps", S. Kotha, R. Ali, *In-House Symposium-2012,* Department of Chemistry, IIT Bombay, March 10, 2012.

Balakrishna M.S.

"Ferrocenyl Bisphosphonite, $[(C_5H_4)_2Fe\{P(OC_6H_3(OMe\text{-}o)(C_3H_5\text{-}p))_2\}_2]$: Synthesis, Organometallic Chemistry, Electrochemical and Catalytic Studies", Sowmya Rao and M. S. Balakrishna, *Modern Trends in inorganic Chemistry (MTICXIB),* December 10-13, 2011, University of Hyderabad, Hyderabad, India.

"Synthesis and Transition Metal Chemistry of Alkynyl Functionalized Cyclodiphosphazanes" (Poster), M. M. Siddiqui and M. S. Balakrishna, *3rd Asian Conference on Coordination Chemistry,* Oct 17-20, 2011, India Habitat Centre, New Delhi.

"Phosphorus Based Ligands: Synthesis, Transition Metal Chemistry and Catalytic Applications" (Poster), P. Kumar, S. Naik, S. Rao, B. Choubey, G. S. Ananthnag, M. M. Siddiqui M. Kumaravel, S. A. Bhat and M. S. Balakrishna, *National Symposium on New Horizons in Chemistry,* Oct 3-4, 2011, Department of Chemistry, Indian Institute of Technology Bombay.

"Triazole Based Phosphinite and Phosphonite Ligands: Syntheses, Derivatization and Transition Metal Chemistry" (Poster), B. Choubey and M. S. Balakrishna, *3rd Indo-German Symposium on "Frontiers of Chemistry",* Sep 27-28, 2011, Department of Chemistry, Indian Institute of Technology Bombay.

"Copper (I) Chemistry of "Short Bite" Aminobis (Phosphonite) and Bisaminotetrakis (Phosphonite/ Phosphine) Ligands" (Poster), S. Naik and M. S. Balakrishna, *3rd Indo-German Symposium on Frontiers of Chemistry,* Sep 27-28, 2011, Department of Chemistry, Indian Institute of Technology Bombay.

"Novel Bisphosphomide Based PCP Pincer Ligand: Synthesis and Transition Metal Chemistry" (Poster), P. Kumar and M. S. Balakrishna, *3rd Indo-German Symposium on "Frontiers of Chemistry",* Sep 27-28, 2011, Department of Chemistry, Indian Institute of Technology Bombay.

"Cyclodiphosphazanes with Donor Functionalities: Synthesis, Reactivity, Transition Metal Chemistry and their Applications" (Poster), G. S. Ananthnag and M. S. Balakrishna, *Chemistry of Functional Materials, CFM 2011,* Aug 12-14, 2011, Goa, India.

"Synthesis and Transition Metal Chemistry of Cyclodiphosphazanes with Donor Functionalities", (Poster), G. S. Ananthnag and M. S. Balakrishna, *Inhouse symposium,* Feb 26, 2012, Department of Chemistry, Indian Institute of Technology Bombay.

"Transition Metal Based Sandwich Derivative with Donor Functionalities: Synthesis, Organometallic Chemistry and Application in Catalysis" (Oral presentation), S. Rao and M. S. Balakrishna, *Inhouse symposium, Feb 26, 2012,* Department of Chemistry, Indian Institute of Technology Bombay.

Patwari G. Naresh

"Spectroscopy and Dynamics of Molecules and Clusters SDMC 2012" in Bangalore in Feb. 2012.

Chowdhury Arindam

Symposium on Spectroscopy and Dynamics, IISER Pune, April 2012.

Fernandes Rodney A.

Presented a poster titled "A New Strategy to Synthesize Paraconic Acids" Asim K. Chowdhury and Rodney A. Fernandes, *at 3rd Indo-German Symposium on Frontiers of Chemistry*, Department of Chemistry, IIT-Bombay, Mumbai, India, September 27-28, 2011.

Presented a poster titled "β-Pinane based Chiral Bis-π-allylpalladium Complex Catalyzed Asymmetric Allylation of Imines" Jothi L. Nallasivam and Rodney A. Fernandes, at *3rd Indo-German Symposium on Frontiers of Chemistry* held at Department of Chemistry, IIT-Bombay, Mumbai, India, September 27-28, 2011.

Presented a poster titled "A Control of Diastereoselectivity in Orthoester Johnson-Claisen Rearrangement of Tartrate Based Allyl Alcohol: An Efficient Synthesis Arundic Acid" Arun b. Ingle and Rodney A. Fernandes, at *3rd Indo-German Symposium on Frontiers of Chemistry* held at Department of Chemistry, IIT-Bombay, Mumbai, India, September 27-28, 2011.

Presented a poster titled "Dötz Benzannulation route to the Synthesis of (–)- and (+)-Juglomycin A, (+)-Eleutherin, (+)-Allo-eleutherin and (–)-Hongconin and

(•)-1-Epi-hongconin" Vijay P. Chavan and Rodney A. Fernandes, at *the National Symposium on New Horizons in Chemistry, Department of Chemistry, IIT-Bombay, Mumbai, India, October 3-4, 2011.*

Presented a poster titled "Bidirectional Approach to the Total Synthesis of (+)-Demethoxycardinalin 3" at *the National Symposium on New Horizons in Chemistry,* Department of Chemistry, IIT-Bombay, Mumbai, India, October 3-4, 2011.

Presented a poster titled "Development of Menthane Based Chiral Bis-π-allylpalladium Catalysis: Asymmetric Allylation of Imines" Dipali A. Chaudhari and Rodney A. Fernandes, at *National Conference on Chirality-2011 (NCC-2011),* Department of Chemistry, The Maharaja Sayajirao University of Baroda, India, Vadodara, December 02-03, 2011.

Presented a poster titled "Newer Strategy to Paraconic Acids Synthesis" Asim K. Chowdhury and Rodney A. Fernandes, at *National Conference on Chirality-2011 (NCC-2011),* Department of Chemistry, The Maharaja Sayajirao University of Baroda, Vadodara, India, December 02-03, 2011.

Presented a poster titled "Total Synthesis of Topsentolide B_2 and Assignment of Absolute Configuration" Katanguru Pullaiah and Rodney A. Fernandes, at *7th NOST conference for research scholars (J-NOST), Indian Institute of Science Education and Research Mohali (IISER Mohali), Mohali, India*, December 15-18, 2011.

Presented a poster titled "Diastereoselective Synthesis of (+)-Nephrosterinic acid" and (+)-Protolichesterinic acid Mahesh B. Hale and Rodney A. Fernandes, at *In-House Symposium-2012, Department of Chemistry, IIT-Bombay, Mumbai, India.* March 10, 2012.

Rajaraman Gopalan
Chemistry of Functional Materials, Goa. August 2011.

Maheshwaran Shanmugam
Chemistry of Functional Materials Annual Coordination Chemistry Conference-3 held in Delhi, 2011, and *MTIC-IV* held in Hyderabad, 2011.

Kishore Nand
The 66th Calorimetry Conference held at Oahu, Hawaii, USA, During 12-17 June 2011, November 12-15, 2011.

Developments in Protein Interaction Analysis 2011, November 12-15,2011. Boston, Massachussetts, USA.

TA Instruments Usrs Meet & Symposium, May 29 - June 02, 2012, New Orleans, LA, USA.

Sunoj R.B.
9th Triennial congress of the World Association of Theoretical and Computational Chemists (WATOC2011), Santiago de Compostela, Spain, July 2011.

Patwari G. Naresh
XIX International Conference on Horizons in Hydrogen Bond Research on September 2011 in Gottingen, Germany

Chowdhury Arindam
Spectroscopy and Dynamics of Molecules and Clusters, Bangaluru, February 2012

Pradeepkumar P.I.
"G-Quadruplex DNA Stabilizing Agents Based on 1,8-Naphthyridine", *15th Symposium on Nucleic Acid Components*, held during June 5-10, 2011, at Cesky Crumlov, Czech Republic

Rajaraman Gopalan
Modern Trends in Inorganic Chemistry, University of Hyderabad, October 2011.

Conferences/Symposia/Workshops/ Seminars(Coordinated/Chaired by Faculty)

Datta Sambhu N.
Coordinated and chaired a session of the UGC sponsored *National Conference on Recent Advancement in Chemical Science: 2011* held during November 18-19, 2011 at J. K. College, Purulia.

Singh H.B.
Chaired a session and member National Organising Committee, *Modern Trends in Chemistry-XIV* held at University of Hyderbad, December 10-13, 2011

Chaired of a session at *National Symposium on New Horizons in Chemistry* held at IIT Bombay, October 3-4, 2011

Chaired of a session at *Chemistry of Functional Materials held at Goa,* August 12-14, 2011

Murugavel R.
Chaired 2nd *Annual Meeting on Chemistry of Functional Materials-2012*, August 12-14, Holiday Inn, Goa

Datta Anindya
Coordinated a *National Seminar on Chemistry* in St. Xaviers College, Kolkata, 26th and 28th February, 2012.

Coordinated at *National Symposium on New Horizons in Chemistry* held during 03-04 October, 2011 at VMCC, I.I.T. Bombay.

Ghosh Prasenjit
Chaired for Session VI (September 28, 2011, Wednesday), *3rd Indo-German Symposium on Frontiers of Chemistry,* Indian Institute of Technology Bombay, September 27-29, 2011.

Chaired "Emerging Horizons of Functionalized N-heterocyclic Carbenes: Catalysis and Beyond", *New Horizons in Chemistry*, Indian Institute of Technology Bombay,.October 3-4, 2011.

Chaired "Emerging Horizons of Functionalized N-heterocyclic Carbenes: Catalysis and Beyond", *3rd Asian Conference on Coordination Chemistry (ACCC-3)* India Habitat Center, New Delhi, October 17-20, 2011.

Chaired "Building Large Molecules From Small Molecules By Polymerization Reactions Employing New Tansition Metal Based Initiators", *Past, Present And Future of Suprmolecular Chemistry (PPFSC-2011)* Agra, India, December 22 24,

Invited Lectures

Datta, S. N.
"Derivation of Relativistic Molecular Hamiltonian for Quantum Chemistry" in *National Symposium on New Horizons in Chemistry* held during 03-04 October, 2011 at VMCC, I.I.T. Bombay.

Presented a plenary lecture "Theoretical Investigation of Magnetic Molecules" in UGC sponsored *National Conference on Recent Advancement in Chemical Science: 2011,* held during November 18-19, 2011 at J. K. College, Purulia.

Balakrishna M.S.
"Simple Tertiary Phosphines to Hexaphosphane Ligands: Synthesis, Transition Metal Chemistry and their Catalytic Applications" (invited talk), M. S. Balakrishna, Sowmya Rao, Bimba Chaubey, *Modern Trends in inorganic Chemistry (MTICXIB),* December 10-13, 2011, University of Hyderabad, Hyderabad, India.

"Cyclodiphosphazanes: Excellent Ligands for Transition Metal Chemistry, Catalytic and Biological Applications", M. S. Balakrishna, *3rd Asian Conference on Coordination Chemistry,* Oct 17-20, 2011, India Habitat Centre, New Delhi.

"Cyclodiphosphazanes with Functionalities: Synthesis, Reactivity and Transition Metal Chemistry", M. S. Balakrishna, *242nd ACS National Meeting,* Aug 28-Sept 01, 2011, Convention Centre, Denver, Colorado, USA.

Murugavel R.
"Disopropylphosphate: A Verstatile Synthon in Metal Phosphate Chemistry", at the *Asian Coordination Chemistry Conference,* New Delhi (October 17, 2011)

"Metallophosphate-Polyoxometalate Hybrids: Synthesis and Catalysis Aspects", at the *Meeting on Chemistry & Physics of Advanced Materials,* Vedic Village, Kolkatta (Oct. 30, 2011)

"Disopropylphosphate: A Verstatile Synthon in Metal Phosphate Chemistry", at the *Indo European Symposium on Frontiers of Chemistry,* NISER, Bhubaneshwar (Nov. 11, 2011)

"Do Discrete Molecular Clusters Add Up to Complex Structures?", at the *Symposium on Modern Trends in Inorganic Chemistry,* University of Hyderabad (Dec. 11, 2011)

"Rational Routes to Zeolitic Structures", at the *National Seminar on Recent Advances in Chemistry* at Jadavpur University (Feb. 10, 2012).

"Do Discrete Molecular Clusters add up to Porous Structures?", at *IIT Kanpur (March 16, 2012).*

Anil Kumar
"Functional Organic Semiconductors based on Conjugated Polymers and their integration with Electronic Devices: Challenges and Opportunities" at *National Conference on "Polymer Science and Nanotechnology: Design and Structure",* held on December 16-17 2011, at Applied Chemistry Department MS University Vadodara.

"Functional Organic Semiconductors Based on Conjugated Polymers and their integration with Electronic Devices: Challenges and Opportunities" at *ISSS International Conference on "Smart Materials, Structures and Systems"* held on January 4-7, 2012 at the Indian Institute of Science, Bangalore.

"Functional Conducting Polymers for Sensor Applications: Challenges and Opportunities" at *Advanced Chemical Sensors and Applications (ACSAP-2012)* held on March 20-21, 2012 IGCAR Kalpakkam.

"Science and Magic: Art of 'Active' Learning and Research", IGCAR Kalpakkam, and at many other places.

Datta Anindya
"Ultrafast Dynamics in Epicocconone and its Derivatives" in *National Symposium on New Horizons in Chemistry* held during 03-04 October, 2011 at VMCC, I.I.T. Bombay.

"Femtosecond Optical Gating" and "Excited State Proton Transfer in Nafion" in *National Fluorescence Workshop held in ICGEB*, New Delhi on November 14 18, 2011.

"Photoluminescent silica Nanostructures" in *St. Xaviers College,* 26th February, 2012.

"Dynamics of Water and Protons in the Nanochannels of Nafion" in *March Meeting, SPS, Jawaharlal Nehru University*, New Delhi, 2nd March, 2012

Fernandes Rodney A.
Presented an oral presentation on "The Total Synthesis of (8S,11R,12R)- and (8R,11R,12R)-Topsentolide B_2 Diastereomers and Assignment of Absolute Configuration", Katanguru Pullaiah and Rodney A. Fernandes, at *National Conference on Chirality-2011 (NCC-2011), Department of Chemistry, The Maharaja Sayajirao University of Baroda, Vadodara,* India, December 02-03, 2011.

Presented an oral presentation on "Dötz Benzannulation: Strategic Utility in Pyranonaphthoquinones Synthesis" Vijay P. Chavan and Rodney A. Fernandes, at *7th NOST Conference for Research Scholars (J-NOST),* Indian Institute of Science Education and Research Mohali (IISER Mohali), Mohali, India, December 15-18, 2011.

Singh H.B.
"Organochalcogen Chemistry: Isolation and Reactivity of Novel Selenenium Cations, Selenylcynates, Selenenyl azides and Chalcogenones, at *International Conference and Humboldt Kolleg* held at University of Lucknow, January 3-6, 2012

Datta, S. N.
"Derivation of Relativistic Molecular Hamiltonian for Quantum Chemistry" in *Ninth Triennial Congress of the World Association of Theoretical And Computational Chemists*, held during 17-22 July, 2011 at Santiago de Compostela (Spain).

"Integrated Rate Expression for Carbon Dioxide Assimilation in Green Plants" in *International Symposium on "Chemistry and Complexity",* held during 06-08 December, 2011 at IACS, Jadavpur, Kolkata 700 032.

Murugavel R.
"Role of Double-Four-Ring Beyond Building Block Chemistry and Some Aspects of COFs", at Ruhr-University, Bochum, (September 15, 2011)

Kaliappan K.P.
"The Role of Organic Synthesis in Drug Discovery: Hybrid Natural Products-A Potential Source for Follow on Drug Discovery" at *the Fourth Indo-American Kavli-Frontiers of Science Symposium* USA from April 15, 2011 to April 18, 2011.

Datta Anindya
"Excited State Dynamics in Molecules and Materials" *In Trombay Symposium on Radiation and Photochemistry*, January 3-7, 2012

Chowdhury Arindam
"Photoluminescence Intermittency of Highly Localized Emission Centers within InGaN/GaN Quantum-Well (QW) LEDs", *Oral presentation in International Conference on Luminescence (ICL2011),* University of Michigan, Ann Arbor, MI, USA, June 2011.

Kotha Sambasivarao
"Nobel Prize 2010-Chemical Sciences", Department of Chemistry, Institute of Chemical Technology and many other places.

"Development of New Synthetic Methods", Dept. of Chem. Mysore University Mysore, Thathachary award lecture, 7th May 2011.

"Synthesis of Conformationally Constrained a Amino Acid Derivartives", Group Monitoring Workshop, CSIR, New Delhi, 13th October 2011.

"Motivation and inspiration", SVRM college, Nagaram, DST Inspire program and many other places.

"Rongalite: A Useful Green Reagent in Organic Synthesis", Department of Chemistry, JNTU-Hyderabad and many other places.

"New Strategies to Cyclophanes via Olefin Metathesis", Department of Chemistry, Shivaji University Kolhapur, 21st January 2012.

"Basics of IR spectroscopy", Chalapathi Institute of Pharmaceutical Sciences, Lam, Guntur 13th January 2012.

"Applications of IR spectroscopy", Chalapathi Institute of Pharmaceutical Sciences, Lam, Guntur, 13th January 2012.

"Design of Cyclophanes via Oefin Metathesis", Department of Chemistry, SV University Tirupathi, 19th March 2012

"Olefin Metathesis: New Strategies to Cyclphane Frameworks", Rennes-France, *International Symposium on Olefin Metathesis & Related Chem,* 13th July 2011.

Balakrishna M.S.
"Synthesis and Reactivity of Inorganic Rings with and without Metals", February 22. 2012, Central University, Hyderabad.

"Designing Phosphorus Based Compounds as Ligands for Transition Metal Chemistry and Catalytic Applications", January 11. 2012, Delhi University, Delhi.

"Chemistry is not a Problem if it is Learnt Through Problems", (Inaugural Talk, Chemistry Year 2011 Celebration), December 15, 2011, Vijaya College, Mulki, Mangalore.

"Simple Tertiary Phosphines to Hexaphosphane Ligands: Synthesis, Ttransition Metal Chemistry and their Catalytic Applications", Sept 03. 2011, Tulane University, New Orleans, USA.

"Chemistry of Main Group and Transition Metal elements: Structure, Bonding and Reactivity", Sept 26, 2011, Department of Chemistry, SG University, Amaravathi, Maharashtra.

"Phosphorus: Most Valuable Element in Chemistry, Industry and Biology" (Inaugural Talk, Chemistry Teacherss Association, 13th Annual Meet, Sept 25, 2011, SG University, Amaravathi, Maharashtra.

Namboothiri I.N.N.

"Approaches to Transition State Analogs of Amino Acids Through Asymmetric Michael Addition of Phosphonates and Phosphites to Electron Deficient Alkenes", February 10, 2012, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, India.

"Reactions of Electron Deficient Alkenes with Bestmann-Ohira Reagent and Diazosulfone for the Synthesis of Functionalized Pyrazoles and Pyrazolines", Jan 25, 2012, SeQuent Scientific Limited, Mangalore, India.

"Multi-component and Cascade Reactions of Conjugated Nitroalkenes", Dec 27, 2011, Department of Organic Chemistry, Indian Institute of Science, Bangalore, India.

"Synthesis and Applications of Morita-Baylis-Hillman and Rauhut-Currier Adducts of Nitroalkenes", September 02, 2011, Department of Chemistry, The City College of New York, CUNY, USA.

"Reactions of Diazophosphonates and Diazosulfones with Electron Deficient Alkenes in the Synthesis of Functionalized Pyrazoles and Pyrazolines", May 09, 2011, IIT Kharagpur, West Bengal, India.

"Synthesis and Evaluation of Polycarbocyclic Cage Based High Energy-Density Materials", April 20, 2011,Vikram Sarabhai Space Centre, Thiruvananthapuram, India.

"Chirality, Symmetry, Configuration and Conformation", March 28, 2011, Vaze College, Mulund, Mumbai, India.

Kaliappan K.P.

"Hybrid Approach to New Molecular Scaffolds" at Institute of Life Sciences, Hyderabad on June 13, 2011.

"Hybrid Approach: A Potential Source for Drug Discovery" at School of Chemistry, University of Hyderabad, June 14, 2011.

"Organic Synthesis: Where are we now?" at Madurai Kamaraj University, Madurai on July 14, 2011.

"Natural Products in Drug Discovery" at Madurai Kamaraj University, Madurai on July 14, 2011.

"Organic Synthesis in Drug Discovery" at NIT-Tiruchirappalli, on October 22, 2011.

"A Hybrid Approach to New Molecular Scaffolds" at Department of Chemistry, IIT Bombay, November 11, 2011.

"Agonies and Ecstasies in Total Synthesis" at School of Chemistry, University of Hyderabad on February 26, 2012.

"The Role of Organic Synthesis in Drug Discovery: Hybrid Natural Products-A Potential Source for Follow on Drug Discovery" at the *Fourth Indo-American Kavli-Frontiers of Science Symposium,* USA from April 15, 2011 to April 18, 2011.

Fernandes Rodney A.

"Challenges and Opportunities in the Total Synthesis of Natural Products." Delivered at the "Indo French Conference in Organic Synthesis" organized by National Chemical Laboratory, Pune, at
many other places.

"Development of New Strategies for Total Synthesis of Natural Products". Delivered at the "Celebrations of Chemistry at IIT-Kanpur" organized by the Department of Chemistry, Indian Institute of Technology Kanpur, Kanpur, December 03-05, 2011.

"Synthetic Strategies to Highly Substituted gamma-Lactones, a New Avenue". Delivered at the "Conference in Chirality" organized by the Department of Chemistry, MS University Baroda, Baroda, December 02-03, 2011.

"From Blue-Print to Execution: The Art of Total Synthesis of Bioactive Natural Products". Delivered at the "Humboldt Kolleg on Science Globalization and Human Development" organized by Humboldt Academy, Pune Chapter, Bogmallo, Goa, November 11-13, 2011.

"Newer Synthetic Strategies to Highly Substituted gamma-Lactones and Beyond". Delivered at the

symposium on "New Horizons in Chemistry" in the Department of Chemistry, IIT Bombay, October 3-4, 2011.

"Development of Dimeric Fischer Carbenes: A Bidirectional Dötz Benzannulation Approach to Dimeric Pyranonaphthoquinones". Delivered at the *4th International Conference in Drug Discovery and Therapy*, organized by Higher Colleges of Technology, Dubai, February 12-15, 2012.

Kulkarni Suvarn S.
"Organic Chemistry of Sugars" at Madurai University, *Organic Chemistry Refresher Course*, July 23, 2011 .

"Protecting Groups in Carbohydrate Synthesis" at Madurai University, *Organic Chemistry Refresher Course*, July 23, 2011.

"Real Time Applications of 2D NMR" at Vaze College, *RSC Popular Lectures for PG Students*, July 30, 2011 .

"Protecting groups in organic synthesis" at SIES College, *RSC Popular Lectures for PG Students*, August 3, 2011.

"Regioselective approaches for glycoconjugate synthesis", at *Carbo XXVI Symposium* 25 Nov 2011.

"Synthesis of complex carbohydrates and glycoconjugates", at ILS Hyderabad, Dec 17, 2011.

Rajaraman Gopalan
In New Horizons in Chemistry, IIT-Bombay October, 2011.

Significant Awards and Distinctions

Singh H.B.
Institute Chair Professorship from June 2011, Renamed as Biswas-Palepu Distinguished Chair Professor, Department of Chemistry, IIT Bombay
Awarded CRSI Silver Medal 2012
Selected for HAG scale in 2012 with effect from 18th August 2009
Elected Fellow of the Indian National Science Academy (FNA) New Delhi, India, 2012
Invited to join the Advisory Board of American Society journal Organometallics 2012-2015
The IIT Bombay Review Paper Award for the Year 2011

Kotha Sambasivarao
Elected as a Fellow of Royal Society of Chemistry
IIT-Bombay Best Review Paper Award (2011)
IIT-Bombay Best Review Paper Award (2011)
Editorial board member *(J. Chem. Sci.* Indian Academy of Sciences 2009-2011).
Editorial Board Member (*Indian J. Chem.* 2011-2013).
Editorial Board member (*Journal of Amino Acids*)
Editorial Board member (*Catalysis Journal*)
Pramod Choudhary Chair Green Chemistry & Ind. Biotechnology

Sunoj R.B.
A.V. Ramarao Research Foundation (AVRA) Young Scientist Award 2012.

Ghosh Prasenjit
Editorial Board Member, Polyhedron, Elsevier Publishers (2011-2013).

Associate Editor, Global Journal of Inorganic Chemistry, Simplex Academic Publishers (2011-2013).

The Distinguished Lectireship Award, The Chemical Society of Japan, Japan, conferred at CSJ Asian International Symposium, 2011.

Rajaraman Gopalan
IIT-Bombay Young Investigator award for the year 2011.

Balakrishna 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 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 Prasenjit
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

Honorary Work

Datta, S. N.
Reviewed articles for The Journal of Physical Chemistry, Chem. Comm., Computational and Theoretical Chemistry and Indian Journal of Physics.

Kotha Sambasivarao
Reviewer to various journals (Indian J. Chem., J. Chem. Sciences, Adv. Syn. Cat., Org. Biol. Chem., Synlett, J. Org. Chem., Arkivoc, Tetrahedron Lett., Eur. J. Org. Chem., New J. Chem., Chem. Lett., Green Chem., Synth. Commun., J. Amino Acids, App. Organomet. Chem.

Murugavel R.
Served as Reviewer for various journals and as Editorial Board Member, Synth React Inorg Met Org Nano-Met Chem, 2008.

Anil Kumar
Served in the editorial board of Polymer Reveiws

Namboothiri I.N.N.
Served as Editorial Board Member of Journal of Chemical Sciences; Member, Editorial Board of Referees, ARKIVOC; and Reviewer of ACS, RSC, Wiley, Elsevier, Thieme and Indian journals.

Kaliappan K.P.
Served as Reviewer for several manuscripts various journals and Evaluated several projects from various funding agencies like CSIR, DST, etc.

Datta Anindya
Reviewed articles for The Journal of Physical Chemistry, Chem. Comm., Journal op f Photochemistry and Photobiology, Physical Chemistry Chemical Physics, Journal of Colloid and Interfacial Science, Colloids and Interfaces, Journal of Chemical Sciences, Photochemistry and Photobiology etc., and reviewed project proposals for CSIR, BRNS and DST.

Sunoj R.B.
Reviewed DST, CSIR, DAE-BRNS projects, JEE/GATE; Reviewer and adjudicative reviewer for royal society of chemistry; journals such as Chemical Communications, Physical Chemistry; Chemical Physics, Dalton Transactions, and Organic and Biomolecular Chemistry; Reviewer for American chemical society journals: Journal of American chemical society, Organic Letters, and Journal of Organic Chemistry; Reviewer for Wiley-VCH journals: European Journal of Organic Chemistry and European Journal of Inorganic Chemistry; Reviewer for Elsevier journals: Tetrahedron and Tetrahedron Letters; and Reviewer for Journal of Chemical Sciences (an Indian Academy of Sciences publication).

Ghosh Prasenjit
Served on the Sciences Screening Committee for the award of the Fulbright fellowship meant for the senior researchers.

Chowdhury Arindam
Reviewed manuscripts for The Journal of Physical Chemistry, Langmuir, Journal of Agricultural and Food Chemistry (ACS), Applied Physics Letters, Advanced Functional Materials and The Journal of Experimental Nanoscience, and served as an international external reviewer for the evaluation of research grants submitted to Qatar National Research Fund

Fernandes Rodney A.
Refereed papers for International Journals: Tetrahedron, Tetrahedron Letters, Eur. J. Org. Chem., Journal of Chemical Sciences, etc.

Pradeepkumar P.I.
Reviewed papers for The Journal of Chemical Sciences and Journal of Drug Targeting

Kulkarni Suvarn S.
Reviewed several manuscripts for American Chemical Society; Organic Letters (2); Journal of Organic Chemistry (12), Wiley; European Journal of Organic Chemistry (2); Royal Society of Chemistry; Organic Biomolecular Chemistry (1); Elsevier; Tetrahedron (4); Bentham Science; Current Medicinal Chemistry (1); Indian Academy of Sciences; and Current Science (2); Served as an international external reviewer for the evaluation of research grants submitted to Research Grant Council of Hongkong.

Rajaraman Gopalan
Reviewer and adjudicative reviewer for a number of journals including Chem. Comm., Dalton. Trans., J. Mater. Chem., Phys. Chem. Chem.Phys., Eur. J. Inorg. Chem., J. Phys. Chem., Polyhedron etc. and Reviewer for research proposal from DST and BRNS, India.

Maheshwaran Shanmugam
Reviewed papers for International Journal such as Chemical Communication.

Faculty members and their Specializations

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:Inorgnaic Chemistry
Specific:Organometallic Chemistry

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

6. Datta Sambhu N.
Relativistic Quantum Theory
Theoretical Aspects of Photosynthesis
Molecular Magnets and Materials

7. A. Q. Contractor
General:Physical Chemistry
Specific:Electrochemistry

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

9. Rao C.P.
Inorganic Chemistry; Coordination Chem.; and Bioinorganic, Biomimetic and Biointeraction Chemistry of model Molecules and Protein/enzyme; Sensors for cations and anions; Binding of glycoconjugates with Lectins and glycosidase inhibitors; Computational modeling; artificial metalloenzymes; molecular mechanics and molecular dynamics simulations of protein-small molecular interactions

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. Murugavel R.
Inorganic Chemistry
Materials Chemistry

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. Datta Anindya
Ultrafast dybamics of molecules and materials

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. Chowdhury Arindam
Experimental Physical Chemistry: Imaging, spectroscopy and dynamics of single fluorescent molecules/luminescent nanocrystals

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. Pradeepkumar P.I.
General : Organic Chemistry
Specific : Chemical Biology of Necleic Acids

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

29. Kulkarni Suvarn S.
Organic Synthesis, Glycochemistry, Chemical glycobiology

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

31. Maiti Debabrata
General : Inorganic Chemistry
Specific : Synthetic Methodololgy and Organometallic Chemistry

32. Maheshwaran Shanmugam
Coordination chemistry, molecular magnetism, small molecule activation

Civil Engineering

Introduction

The Department of Civil Engineering has been a part of IITB since its inception in 1958. Over the years, the department has grown tremendously and is now recognised as one of the major engineering departments in the country. It has developed strong links with the building and construction industry and the academia, both inside 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. With its multifaceted faculty, it provides technical advisory support through various R&D projects and consultancy to infrastructural industry and academic and research institutions. At present, the department has a strength of 38 core faculty members in the following five areas: Structural Engineering, Geotechnical Engineering, Water Resources Engineering, Geodesy and Remote Sensing, and Transportation Systems Engineering.

Academic Programmes

The department offers a 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, 48 M.Tech. and 23 Ph.D. students were admitted in the above specializations. In the first year, 120 students were on roll in the B.Tech. programme. The students that graduated from the department are as follows:

Degree Awarded	
B.Tech.	: 47
M.Tech.	: 36
Ph.D.	: 16
Dual Degree	
B.Tech.	: 23
M.Tech.	: 23

R&D Activities

Sponsored Research

Sponsored Research Projects	**: 47**
New	: 8
Ongoing	: 33
Completed	: 6

The department received eight new sponsored projects with a sanctioned outlay of Rs. 1,31,52,856. These are as follows:

Project Title	Sponsoring Agency
Seismic fragility of the primary containment considering structural integrity and leakage through the damaged containment	Atomic Energy Regulatory Board
Characterisation of Non-Linear Fluid Viscous Dampers to Control High-Velocity Shocks	DRDO
Downscaling for projections of indian rainfall and temperature at high spatial resolution.	ISRO
Near Real-Time Detection and Assessment of Disbonds in Honeycomb Composite Sandwich Structures using Ultrasonic Guided Waves.	ISRO
Seismic Vulnerability Assessment of Building Types in India	National Disaster Management Authority
Static and Dynamic Analyses of Reduction of Earth Pressure on Retaining Walls Using Compressible Geo-inclusions	Ministry of Earth Sciences
Water management under uncertainty in climate change impacts on river basin hydrology	DST
Seismic fragility of the primary containment considering structural integrity and leakage through the damaged containment	Atomic Energy Regulatory Board

Consultancy Work

As many as 329 consultancy projects worth about Rs. 13.96 crores were undertaken during the year by the department. Twenty four faculty members were involved in the above consultancy work.

Patents

Singh, D. N. "Estimation of Tensile Strength of the Soil from its Penetration Resistance". *(Provisional Indian Patent Application No. 220/MUM/2012)*

Extension Activities

In order to encourage and facilitate interaction amongst practitioners and researchers, the following activities were organized: 4th National Civil Engineering Students Symposium (AAKKAR), 3-4 March 2012, Civil Engineering Association, IIT Bombay; Short-Term QIP-CEP Course on "Advanced Foundation Engineering" IIT Bombay, June 20-24, 2011; CEP Course (Open) on "Urban Drainage Management-State-of-the-Art", IIT Bombay, July 4-16, 2011; QIP & Short-Term Course on "Hydraulics and the Environment", August 01-05, 2011; QIP & CEP Course on "Finite Element Method & Applications in Civil Engineering", August 16-20, 2011; CEP Short-Term Course on "Refresher Cum Orientation Course on Road Works for BMC Engineers", IIT Bombay, November 21-25, 2011; CEP Course for ONGC Engineers "Rainwater Harvesting & Sustainable Water Management", November 24-26, 2011; CEP Short-Term Course on "Interlocking Concrete Block Pavements (ICBP): Technical and Administrative Aspects", IIT Bombay, November 26, 2011; CEP & QIP Short-Term Course on "Coastal Processes and Modeling", March 19-23, 2012; QIP & CEP Short-Term Course on "Hydraulic Structures", March 12-16, 2012; and CEP Course on "Rainwater Harvesting & Sustainable Water Management", March 30-31, 2012.

Visitors to the Department

Name of Affiliation	Date	Lacture Topic
Dr.-Ing. Shailesh Kumar Singh, Scientist (Hydrology), NIWA (National Institute of Water and Atmospheric Research), New Zealand.	11-05-2011	Robust Parameter Estimation for Model using Data Depth Function
Dr. R. G. Robinson, Associate professor, IIT Madras.	18-07-2011	Testing Methods and Soil Properties
Mr. zeljorad Maricic, Product Development Engineer GCTS TestingSystems, USA.	18-07-2011	Advancements in Geotechnical/Pavement Testing
Dr.Paul J Bullock, Fugro Consultants Inc. – Load test, Florida, USA.	15-09-2011	Bi-directional Load Testing of Piles using Osterberg Cell (O-cell).
Prof.A.Boominathan, Department of Civil Engineering, IIT Madras	30-09-2011	Microzonation Studies for Chennai City
Dr.Debashis Raha, Australia	03-10-2011	Water and Climate Change
Mr.Vikram Lall, Lall & Associates, New Delhi	08-11-2011	Buddhist Architecture – Evolution of building forms and their architectural/engineering connotations
Dr. Katrin Beyer, Assistant Professor, Ecole PolytechniqueFederale de Lausanne (EPFL) in Switzerland.	01-12-2011	Spandrel Elements in Unreinforced Masonry Walls – An experimental and numerical investigation
Dr. Amit Kumar Sinha, GIS specialist, Environmental Systems Research Institute Inc, California.USA.	13-12-2011	Esri GIS Practitioners – Perspectives and partnerships
Ms. Priya Mazumdar, The Vice President of Andalyze, Inc. USA	05-01-2012	New, Easy & Quick Techniques to Test Heavy Elements in Water
Dr. Arnab Chakraborty, Assistant Professor, University of Illinois at Urbana-Champaign.	11-01-2012	Applying Scenario Analysis to Transportation Planning: Lessons for regional decision-making
Mr.Sundar Chandramouli, Assistant Director – Projects, DB Hospitality Pvt Ltd. Mumbai.	17-01-2012	Dances with Disasters – Effective project management tools in construction
Dr. Takashi Tazoh, Chief Research Manager, Institute ofTechnology, Shimizu Corporation, Tokyo, Japan	23-01-2012	Earthquake Engineering Research on Pile Foundations.
Dr. Yutaka Nakamura, Chief Research Engineer, Institute of Technology, Shimizu Corporation, Tokyo, Japan.	23-01-2012	Report on the Effects of Seismic Isolation Methods from the 2011 Tohoku-Pacific Earthquake.
Mr. Cyrus M. Dordi, Head, Marketing , Gujarat Ambuja Cements Limited, Mumbai	07-02-2012	Journey Through the Concrete Jungle
Prof. Ryosuke Kitamura, Professor and FormerVice-Dean of Engineering at Kagoshima University, Japan.	12-03-2012	Soil Mechanics for Unsaturated Soils
Prof. V.Thamizh Arasan, Transportation Engineering Division, Department of Civil Engineering, IIT Madras, Chennai.	02-04-2012	Meeting the Future Demand for Transport: The Way Forward.

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

Balaji, R.
National Conference on Hydraulics and Water Resources (HYDRO), held during Dec 29-30, 2011 at SVNIT, Surat, Gujarat.

National Workshop on Water Waves and Floating Bodies, at Dept. of Ocean Engineering and Naval Architecture, IIT Kharagpur, Kharagpur, November 25-26, 2011.

8th International Conference on Coastal and Port Engineering in Developing Countries (COPEDEC) at IIT Madras, Chennai, February 20-24, 2012.

Conference on New Frontiers: Shifting Trends in the Global Research Landscape and their Impact on Researchers´ Career Patterns, March 29-30, 2012, The Oberoi Hotel, Gurgaon, New Delhi Capital Region.

GeoCongress-2012, Annual Congress of the Geo-Institute of ASCE, March 25-29, 2012, Oakland, California, USA.

Indian Geotechnical Conference (IGC-2011) at Kochi, Kerala, India December 15-17, 2011. Also acted as a Co-Chair of a Technical Session on "Numerical and Physical Modeling" of *IGC-2011*.

First Indo–Japan Workshop in Geotechnical Engineering, Theme: "Earthquake Geotechnical Engineering", on December 14, 2011.

Bajoria K.M and Sangle K.K
"Finite Element Buckling Analysis of 3-D Conventional Pallet And Drive- In Cold-Formed Storage Rack Structures with Rigid and Semi-Rigid Connections", *Sixth international conference on Thin walled Structures*, Timsoara, Romania, 5-7 September 2011.

Jadhav, P.A. and Bajoria K. M.
"Stability Analysis Of Functionally Graded Plate Integrated With Piezoelectric Actuator and Sensor Subjected to Electro-mechanical Loading", *4th International Conference on Structural Stability and Dynamic (ICSSD)*, 4-6 January 2012.

Dasaka S. Murty
Indian Geotechnical Conference (IGC-2011), 15-17 December, 2011, Kochi, India.

Geosynthetics India 2011 Conference, IIT Madras, September 23-24, 2011, Chennai.

Eldho, T. I.
Indo-Italian Workshop on "Advances in Fluvial Hydraulics & Water Resources Development, CWPRS, September 15-16, 2011, Pune.

IWM 2011, Indian Water Management in 21st Century, IIT Bhubaneswar, December 27-29, 2011, Bhubaneswar.

Indian Geotechnical Conference -2011, December 15-17, 2011, Kochi.

Ghosh, S
Arcelor Mittal Steel Net Workshop on Seismic Design and Construction, July 13-15, 2011, Liège, Belgium.

Key-note paper in the *International Symposium on Engineering under Uncertainty: Safety Assessment and Management (ISEUSAM-12)*, January 04-06, 2012, Howrah, India.

Ghosh S, Kharmale SB, Gupta KA
"Natural Period of Vibration for Expanded Mesh Shear Walls", *8th International Conference on Structural Dynamics (EURODYN 2011)*, Leuven, Belgium, July 04-06, 2011.

Pisharady AS, Ghosh S, Basu PC
"Modal Pushover Analysis of Inner Containment Structure", *21st International Conference on Structural Mechanics in Reactor Technology (SMiRT 21)*, New Delhi, India, November 06-11, 2011.

Salvi, K, Kannan, S. and Subimal Ghosh (2011)
"Finer Scale Temperature and Rainfall Projections for Climate Change Impacts Assessment", *4th International Conference on Environmental and Computer Science*, Singapore, Sept 16-18, 2011.

Saraswat A, Ghosh S, Somyajulu PS, Reddy GR, Kumar A, Ghosh AK
"Seismic Analysis Of Free Standing Glove Box Structure", *21st International Conference On Structural Mechanics In Reactor Technology (SMiRT-21)*, New Delhi, India, November 06-11, 2011.

Bhatia, U, Salvi K., And Subimal Ghosh
"Performance Comparison Of Quantile Base Correction with KNN Technique of Downscaling to Project Future Temperature, *Hydro, 2011*, Surat, India, 29-30 December.

Gopal Rao, K
16th National Conference on Hydraulics and Water Resources, HYDRO-2011, Sardar Vallabhai National Institute of Technology, December 2-30, 2011, Surat.

TECHFEST – 2012 : Guest of Honour : Sri Tiwari College of Engg. : Mira Road

Muniappan, N., Hebsur, A., Rao, E.P. and Venkatachalam, G.
"Geotechnical Subsurface Profiling using GPR Spectral Signatures – A Case Study, *Indian Geotechnical Conference*, Kochi, 16-18 December, 2011.

Gupta, K.
12th International Conference on Urban Drainage, September 11-16, 2011, Proto Alegre, Brazil

Nikam and Gupta, K.
"A Methodology For Rapid Inundation Mapping For A Megacity With Sparse Data: Case Of Mumbai", India, *5th International Conference on Flood Management (ICFM5),* 27-29 September 2011, Tsukuba-Japan

Jothiprakash, V.
Brainstorming Meeting for TIFAC's "Technology Vision 2035", Indian Institute of Technology Bombay, July 30, 2011.

9th R&D Indian National Committee on Hydrology Workshop, Central Water Commission, New Delhi, August 19, 2011.

4th International Ground Water Conference, IGWC-2011, Yadava College, Madurai, September 27- 30, 2011, Tamil Nadu, India,.

16th National Conference on Hydraulics and Water Resources, HYDRO-2011, Sardar Vallabhai National Institute of Technology, Surat, December 2-30, 2011.

Arunkumar R and V. Jothiprakash
"Reservoir Evaporation Prediction using Artificial Neural Networks", *National Conference on Geosummit 2011*, 27-29, Jul. 2011, DST Conference at Sathyabama University, Chennai.

Thinakaran. E And V. Jothiprakash
"River Flow Model Using Link Node Scheme", *4th International Congress On Environmental Research*, Dec. 15-17, 2011, SVNIT Surat, India.

Vignesh, R, V. Jothiprakash, B. Sivakumar
"Forecasting Groundwater Level Fluctuations using Genetic Programming", *4th International Conference on the Impact of Climate Change on Groundwater Resources with Special Reference to Hard Rock Terrain, IGWC-2011,* Sep. 27-30, 2011, Madurai, India.

Vignesh, R, V. Jothiprakash, B. Sivakumar and V. P. Singh
"Study of Streamflow Dynamics in the Western United States", *AOGS 2011*, 08-12. Aug. 2011, Taipei .

Kambekar A R and M C Deo
"Wind-wave Simulation with Genetic Programming", Conferencce: "*Hydro-2011*", Dec. 29-30, SVNIT Surat.

Mandal J.N
International Conference on State of the Art and Practice in Geotechnical Engineering - Geo Congress-2012, March 25-29, 2012, Oakland, CA, USA.

Moseson, A.J., Barsoum, M.W. and Singh, D.N.
"Alkali-Activated Cement for Equitable Slum Improvement in Mumbai, India A Low-CO2, Low-Cost, and Equitable Alternative", *IEEE Global Humanitarian Technology Conference (GHTC)*, Technology for the Benefit of Humanity, 30 October-1 November 2011, Seattle, Washington.

Vedagiri, P.
6th IRF Regional Conference on Road Safety Strategy in India – Action Plan, October 3-5 2011, New Delhi.

2nd National Conference on Intelligent Transportation System, IIT Bombay, August 25-27, 2011.

Kishore Sasane S, S.L.Dhingra and P.Vedagiri
"A Sustainable Approach of Modeling Regional Solid Waste Transport System: Mumbai Metropolitan Region (MMR) a Case Study", *Urban Mobility India Research Symposium*, December 3rd 2011.

Vedagiri, P. and Krishnakumar Subramanian
"Evaluation of Displaced Right-Turn Intersection using Computer Simulation", *Sustainable Urban & Transportation Planning Issues & Management Strategies (SUTRIMS 11)*, NIT Surat, July 08-10, 2011.

Vedagiri, P. and Shikhar Daydar
"Simulation Study of Continuous Flow Intersection Under Heterogeneous Traffic Condition", *International Simulation Conference of India*, IIT Bombay, 02-04 February 2012.

Vedagiri, P. and Sonika Malloth
"Congestion Control Technique at a Junction for Heterogeneous Traffic in India", *International Simulation Conference of India,* IIT Bombay, 02-04 February 2012.

Vedagiri, P., and Shubham Jain
"Simulating Median Side Bus Lanes in Indian Traffic Conditions", *International Simulation Conference of India*, IIT Bombay, 02-04 February 2012.

Vedagiri, P., Dillip, Tom.V. Mathew and Prof. A.G. Ranade
"Intelligent Transit Trip Planner and Route Information System", *2nd National Conference on Intelligent Transportation System*, IIT Bombay, 25-27 August, 2011.

Viswanadham, B.V.S.
One-day Conference on Geosynthetic Lining Systems and Relative Issues, organised by ASCE India Southern region at IISc Bangalore, Bangalore on February 25, 2012.

Geochallenges, Indian Geotechnical Conference 2012, December 14-16, 2011 at Kochi, Kerala, India.

Workshop in the Memory of Karl Terzaghi's Birthday, organised by Indian Geotechnical Society. Kakinada Chapter on October 1, 2011.

Geosynthetics India'11 and *An Introductory Course on Geosynthetics* during September 22-24, 2012, organized by International Geosynthetic Sociery at IIT Madras.

National Workshop on Recent Advances in Geotechniques (rag-11) for Infrastructure Developments, Baroda Chapter, Vadodara on June 18, 2011.

Tom V Mathew
"Design And Evaluation Of An Adaptive Traffic Control System For Heterogeneous Flow Conditions", *2012 Indo-American Frontiers of Engineering*, Arlington, VA, USA, March 1-3, 2012.

Caleb Ronald M, Tom V Mathew, and K V Krishna Rao.
"Development of a Space-oriented Microscopic Simulation Model" for *First Conference of Transportation Research Group of India (CTRG) Bangalore*, India, December 7-10, 2011.

Megraj Nalge, Revathy Nair, Chandan Kancharla, Tom V. Mathew and Narayan Rangaraj
"Real-Time Adaptive Control Policy for Intersection with Downstream Detection", *18th ITS World Congress*, Orlando, USA, Oct 16-20, 2011.

Nuli Sadguna, Tom V Mathew
"Real Time Optimal Signal Control Using Stop Line Detection", *First Conference of Transportation Research Group of India (CTRG)* Bangalore, India, December 7-10, 2011.

Omair Mohammed Abdullah, Caleb Ronald M, Tom V Mathew, and Anirudha Sahoo
"A Strip-based Simulation Model for Mixed Traffic Conditions", *91st Annual Meeting of Transportation Research Board*, Washington D.C., 22-26 January 2012.

Conferences/Symposia/Workshops/ Seminars (Coordinated/Chaired)

Bajoria, K. M.
Chaired a session at *EUROSTEEL 2011*, 31 August - 3 September 2011, Budapest, Hungry,.

Choudhury, D.
Acted as a Panelist and Invited Speaker at Workshop *Alumniportal Deutschland*, March 31, 2012, The Oberoi Hotel, Gurgaon, New Delhi Capital Region.

Eldho, T. I.
Chaired a session in *Hydro 2011*, *Hydraulics & Water Resources,* NIT Surat, December 29-30, 2011.

Ghosh, S
Participated and Chaired a session in the *8th International Conference on Structural Dynamics (EURODYN 2011),* Leuven, Belgium, July 04-06, 2011. Also presented a paper in this conference.

Mandal J.N
Chaired a session in *Indian Geotechnical Conference-IGC -2011*, December 15-17, 2011, Kochi, Kerala.

Pani B S
Chaired a session on *Jets in the Sixth International Conference on Asian and Pacific Coasts*, December 14 – 16, Hong Kong, China

Invited Lectures

Choudhury, D.
"Earthquake Engineering", organized by Alexander von Humboldt Foundation, Bonn, Germany. at The Oberoi Hotel, Gurgaon, New Delhi Capital Region, on 31st March, 2012,

"Need of Study for Seismic Liquefaction and Ground Response for Design of Foundations", at L. D. College of Engineering, Ahmedabad, Gujarat, India on March 16, 2012

"Recent Development in Geotechnical Earthquake Engineering Research at IIT Bombay", at IIT Kanpur, India during Symposium on 'Recent Development in Geotechnical Engineering', on March 3, 2012, organized by Department of Civil Engineering, IIT Kanpur, India.

"Earthquake Disasters and Mitigations – Indian and International Scenario", at Bhilai Institute of Technology, Durg, India, on February 24, 2012, organized by Bhilai Institute of Technology, Durg, India.

"Seismic Liquefaction Hazard and Site Response for Design of Piles in Mumbai", at Hotel Park Central, Kochi, Kerala, India during *First Indo–Japan Workshop in Geotechnical Engineering, Theme: Earthquake Geotechnical Engineering*, on December 14, 2011, jointly organized by Indian Geotechnical Society (IGS), New Delhi, India and Japan Geotechnical Society (JGS), Tokyo, Japan.

"Energy Piles – Modern Geotechnics for Sustainable Development", at Institute for Social and Economic Change (ISEC), Bangalore, India during International Humboldt Kolleg, on October 21, 2011, organized by

Institute for Social and Economic Change (I.S.E.C.), Bangalore, India and supported by Alexander von Humboldt Foundation, Bonn, Germany.

"Recent Advances in Earthquake Resistant Design of Earthen Structures",at GRT Grand Salem, India during *Humboldt Kolleg and International Conference (Earth-Future)*, on September 8, 2011, organized by Periyar University, Salem, India and supported by Alexander von Humboldt Foundation, Bonn, Germany.

"Recent Researches on Geotechnical Earthquake Engineering at IIT Bombay", at Division of Soil Mechanics and Foundation Engineering, Technical University of Kaiserslautern, Germany, on July 12, 2011, organized by Div. of Soil Mechanics and Foundation Engg., Technical University of Kaiserslautern, Erwin-Schroedinger-Str., D-67663, Kaiserslautern, Germany.

"Recent Trends of Research on Geotechnical Earthquake Engineering at IIT Bombay", at International Centre for Geohazards (ICG), Norwegian Geotechnical Institute (NGI), Oslo, Norway, May 26, 2011, organized by ICG, NGI, Ulleval Stadion, NO-0806, Oslo, Norway.

Deo M C
"Application of Data Driven Methods to Coastal Engineering Problems" at TU Delft, on Dec. 6, 2012.

"Effect of Climate Change on Design Waves"at *Hydro-2011 Conference* held at SVNIT Surat during December 29-30, 2011.

Dasaka S. Murty
"Effect of Uncertainties in the Field Load Testing on the Observed Load-Settlement Response", *National Seminar on Advances in Geotechnical Engineering*, SVNIT Surat, October 8, 2011.

Eldho, T. I.
Keynote Lecture, "Integrated Approach of Numerical Modelling, GIS & Remote Sensing for Water Resources Management ", *Hydro 2011*, December 29, 2011, NIT Surat.

"Groundwater Pollution, Remediation & Managemnet", *IWM 2011, Indian Water Management in 21st Century*, in Workshop organized by IIT Bhubaneswar, December 27, 2011, Bhubaneswar.

"Applications of Remote Sensing, GIS & Hydrological Models for Integrated Water Resources Management", *Indo-Italian Workshop on Advances in Fluvial Hydraulics & Water Resources Development*, CWPRS, Pune, September 15, 2011.

"Climate Change & Water Management", Kerala State Electricity Board Engineer's Training, Moolamattom, Kerala, May 20, 2011.

"Integrated Watershed Modeling Using IRS Data & GIS", *IITB-ISRO Workshop*, July 28, 2011.

Ghosh, S
"Research on Heritage Masonry Structures at IIT Bombay", at ENAC, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, on July 08, 2011.

"Seismic Design and Construction: Lightweight and Innovative Solutions using Steel", at Université de Liège, Belgium, on July 13, 2011.

Key-Note lecture on "Seismic Fragility Analysis of the Primary Containment Structure using IDA" at the *International Symposium on Engineering under Uncertainty: Safety Assessment and Management (ISEUSAM-12)*, Howrah, India, January 05, 2012.

Gopal Rao, K
Delivered Guest lecture at College of Engineering, Thiruvananthapuram on "Syllabus Formulation for M.Tech. GeoInformatics", 2010-11.

"Thermal Infrared Remote Sensing" and "Thermal Infrared Data Processing" at *QIP-Short-Term Course on Satellite Image Processing and Analysis*, CSRE-IIT Bombay, January 03-07, 2011.

"Remotely Sensed Data and Digital Image Analysis. Theory and Data processing" at College of Engineering, Thiruvananthapuram, January 2012

"Remote Sensing : Theory and Applications" and "Digital Analysis of Remotely Sensed Data", at College of Engineering, Thiruvananthapuram, January 2011

"Remote Sensing Methods, Analysis and Applications" at Datta Meghe Institute of Engineering Technology & Research,- Wardha (Maharashtra). During *National conference on "Innovative Trends in Technology Development"*, TECHNOCON-2012, January 06-07, 2012.

"Application of ANN in Geotechnical Engg." at ONGC-Mumbai, January 20, 2012.

Gupta, K.
Keynote speaker "Cities Resilient to Floods", *12th International Conference on Urban Drainage*, September 11-16, 2011, Proto Alegre, Brazil

Jothiprakash V
"Introduction to Water Resources Systems Modelling Techniques", Centre for Water Resources, Anna University, Chennai, on 20th Sep. 2011.

"Advanced Water Resources Systems Techniques", Centre for Water Resources, SVNIT, Surat, on 20th Nov. 2011.

"Introduction to Basic Knowledge of Hydrology-needed for Rainwater Harvesting", *CEP Course on Rainwater Harvesting and Sustainable Water management,* IIT Bombay, November 24, 2011.

"Road Drainage – Techniques of Surface and Sub-surface Drainage", *Refresher cum orientation course on Road Works for BMC Engineers*, IIT Bombay, on November 24, 2011.

"Introduction to Basic Knowledge of Hydrology-needed for Rainwater Harvesting", *CEP Course on Rainwater Harvesting and Sustainable Water management*, IIT Bombay, on 30th Mar. 2012.

"Application of Soft Computing Techniques for Reservoir Inflow Prediction", March 16, 2012, at L. D. College of Engineering, Ahmedabad, Gujarat, India, organized by Gujarat Technological University (GTU), India.

Juneja, A.
"Soil Mechanics and Critical State" to the students at Department of Civil Engineering, National Kaohsiung University of Applied Sciences, Kaohsiung, Taiwan (May 2011).

"Small Piled Rafts in Layered Deposits", during *5th Asian Workshop on ATC-18 Mega Foundations*, Hong Kong (May 2011).

"Features of Landfill Closure Construction" and "Air Intrusion in Soil Environment" during the *CSIR Workshop on Emerging Trends in Geo-environmental Engineering* at IPS Academy, Indore (March 2012).

"Finite Element Analysis in Geotechnical Engineering" during the *QIP Short-Term Course on Finite Element Methods with Applications in Civil Engineering* at IIT Bombay (August 2011).

Mandal, J. N.
Delivered Keynote lecture on "Novel Techniques for Ground Improvement in India" , Special Issue of the *First National Conference in the Emerging Vistas of Technology in 21st Century*, The Indian Journal of Technical Education, 14-15th April,2012, Ahmedbad,India,103-114.

Keynote lecture at *First National Conference in the Emerging Vistas of Technology in 21st Century – NCEVT'12,* April 14-15, 2012, Ahmedbad,India.

Pani, B. S.
"Point Source Method of Predicting the Mean Flow Characteristics of Turbulent Jets" at NTU, Singapore, 9th Feb, 2012

"Basic Fluid Mechanics" at GCET Vallabh, Vidyanagar, Gujarat, 24th and 25th Feb, 2012.

Patil G R
"Real-Time Traffic Counting and Monitoring System", *2nd National Workshop on Intelligent Transportation Systems*, IIT Bombay, September 2011.

Prakash Nanthagopalan
"Mixture Design for Pavement Quality Concrete", *Refresher cum Orientation Course on Road Works for BMC Engineers*, November 2011, IIT Bombay.

Rao, E. P.
"Coastal Processes and Modelling" at Civil Engineering Department, IIT Bombay, for the participants of *QIP and CEP Short Term Course*, Mumbai, 19-23 March, 2012.

Singh D N
"Advances in Instrumentation: Geoenvironmental Engineering", Association of Consulting Civil Engineers, Hyderabad Chapter, December 2011.

"Need Based Instrumentation for Various Geoenvironmental Issues", at *INAE Annual Convention*, Hyderabad, December 2011.

"Porous Media Characterization Using Various Energy Fields", at IGS, Hyderabad Chapter, JNTU Hyderabad, December 2011.

"Simulation of Various Geoenvironmental Problems" at SVNIT, Surat, October 2011.

"Rockfall Protection Systems for Landslide-prone Slum Areas in & Around Mumbai City" at Maharashtra Housing and Area Development Authority (MAHADA), Mumbai, Engineers Day, September, 2011.

"Porous Media Characterization Using Various Energy Fields" at IGS, Chennai Chapter, IIT Madras, July 2011.

"Sheet Pile Walls & Braced Cuts" at IIT Bombay, June 2011.

"Foundations on Problematic Soils" at IIT Bombay, June 2011.

"Instrumentation for Characterizing Unsaturated Soils" at IGS Baroda, RAG-2011, June 2011.

"Some Studies on Soil-radionuclide Interaction Under Varied Experimental Conditions" in the *13th International Association for Computer Methods and Advances in Geomechanics Conference*, 10 May 2011, Melbourne.

"Porous Media Characterization Using Various Energy Fields" at Aditya Birla Science & Technology Company, Taloja, Panvel, April 2011.

Raje, D.
"Urban Flooding and Climate Change", in *Three-Day CEP course on Urban Drainage Management:State-of-the-Art*, 14 July, 2011, IIT Bombay, Bombay.

Tom V Mathew
Lecture series on "Transportation Systems Engineering" to the Master's students of Rajiv Gandhi Institiute of Technology, Kottayam, under visiting faculty scheme of the Government of Kerala, March 22-23, 2010.

Viswanadham, B.V.S.
"Performance of Composite Covers of Landfills Subjected to Differential Settlements: Centrifuge Study" on February 25, 2012, at *One-Day Conference on Geosynthetic Lining Systems and Relative Issues* organised by ASCE India Southern region at IISc Bangalore, Bangalore.

"Slope stability evaluation by Limit Equilibrium Methods" at Institute of Engineering and Ocean Technology (IEOT), ONGC, Mumbai on Jan 20, 2012.

"Potential of Geosynthetics in Road Construction" on November 25, 2011 during *Short-term Training course* at IIT Bombay for BMC Engineers.

A key note lecture entitled "Application of Centrifuge-based Physical Modelling to Geotechnical Engineering Practice" on October 1, 2011 during *A Workshop in the memory of Karl Terzaghi's Birthday* organised by Indian Geotechnical Society. Kakinada Chapter.

"Centrifuge modeling of Geosynthetic Reinforced Soil Structures" on September 22, 2011, during Introductory Course on Geosynthetics during *Geosynthetics India 2011* at IIT Madras.

A keynote lecture entitled "Centrifuge Based Modeling of Waste Containment Systems of Landfills and Low-level Radioactive Waste Sites" at *Geosynthetics India Conference* organized by International Geosynthetic Society at IIT Madras during September 23-24 2011.

A Piyush Parikh memorial lecture entitled "Advances in Geosynthetic applications in Geotechnical Engineering" on June 18, 2011, at *National Workshop on Recent Advances in Geotechniques (rag-11) for Infrastructure Developments* organized by Indian Geotechnical Society, Baroda Chapter, Vadodara.

"Centrifuge-based Physical Model Studies on Railway Embankments Constructed with Coal Ash" on June 14, 2011, at RDSO, Lucknow during *Fly Ash Workshop* organized by M/s NTPC Ltd.

Lectures with the following titles (i) "Modelling Techniques in Geotechnical Engineering", (ii) "Centrifuge Modelling of Geotechnical Structures", and (iii) "Centrifuge Modelling of Steel Sheet Pile Walls in Clay" on May 27, 2011, during *AICTE Sponsored Short-Term Training Programme* organised by the Department of Civil Engineering, Government Polytechnic, Goa.

Significant Awards / Distinctions

Balaji, R.
"R J Garde Research Award" by Indian Society for Hydraulics (ISH) in the category of young scientist for outstanding contribution in the field of Hydraulics and Water Resources, 2011-12.

Fellowship from Permanent International Association of Navigational Congress (PIANC) for attending international conference, 2012.

Banerji, P.
Appointed as Director, IIT Roorkee.

Choudhury, D.
"Vivekananda's Excellence Award for Young Scientist – 2011", Varaha College of Architecture & Planning, Varaha Lakshmi Narasimha Swamy Educational Trust, Visakhapatnam, A.P., India, September 2011.

Deo, M.C.
Appointed as Director, VJTI, Mumbai

Eldho, T.I.
"Jalvigyan Purskar for the year 2011-12", instituted by Indian Society for Hydraulics, for the paper entitled "Meshless Point Collocation Method for 1D and 2D groundwater flow simulation", published in the ISH Journal of Hydraulic Engineering, Published in 2011.

Janga Reddy, M.
"BOYSCAST Fellowship Award" by DST, Govt. of India, (2011)

"IIT Bombay Young Investigator Award" by IRCC IIT Bombay, given on 5-Sept-2011

"Shri R.N. Prasad Biennial Award" by Indian Geotechnical Society India, for the best paper published in Indian Geotechnical Journal in 2010, given on 14-Dec-2011.

Jothiprakash, V.
"ISTE-Maharashtra State National Award for Research Work in Engineering and Technology for the Year 2011" by Indian Society for Technical Education, during the 41st Annual Convention of ISTE held at Fatehgarh Sahib, Punjab on 16th Dec 2011.

"Surendranath Mukerjee Memorial Gold Medal for the Best Paper" awarded by Institution of Engineers (India), during 26th Indian Engineering Congress held at Bangalore on 16.12.2011

Singh, D. N.
"John R. Booker Excellence Award-2011" on May 10, 2011 at Melbourne.

Honorary Work

Bajoria, K M
Chairman of Indian ASTR (Association of Structural Rehabilitation)

Balaji, R
Reviewed papers for Journal of Engineering Applications of Computational Fluid Mechanics.
Reviewed papers for ISH Journal of Hydraulics Research.

Chandiramani, N. K.
Reviewer for Journal of Sound and Vibration, ASME Journal of Dynamic Systems, Measurement and Control, Applied Mathematical Modeling, Sadhana, ASCE Journal of Computing in Civil Engineering.

Choudhury, D.
Editorial Board Member of 'ISSMGE Bulletin' (Quarterly Newsletter), published by International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE), London, U.K.; Editorial Board Member of 'Indian Geotechnical Journal (IGJ)' (ISSN: 0046-8983), Springer.; 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. ; Managing/Handling Editor for February 2012 issue (Volume 6, Issue 1) of 'ISSMGE Bulletin', published by International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE), London, U.K.; Member of Award Nomination Committee to shortlist the ASCE Papers for nomination of Awards from UNSAT Technical Committee of Geo-Institute, American Society for Civil Engineers (GI-ASCE), USA.

Reviewer of technical papers for several Journals like (i) Journal of Geotechnical and Geoenvironmental Engineering, ASCE, (ii) International Journal of Geomechanics, ASCE, (iii) Geotechnical Engineering, Proc. of Institute of Civil Engineers (ICE), (iv) Ground Improvement, ICE (v) Geotechnical and Geological Engineering, Springer (vi) Scientia Iranica, Transaction A (vii) Waste Management, Elsevier, (viii) Geotechnical Testing Journal, ASTM, (ix) Soils and Foundations, Elsevier, (x) Earthquake Spectra, EERI (xi) Civil Engineering Journal of Institute of Engineers, IEI, India and (xii) Indian Geotechnical Journal, IGS, India.; Reviewer for GeoCongress 2012: Annual Conference of Geo-Institute (GI), ASCE, USA. ; Reviewer for 64th Canadian Geotechnical Conference and 14th ISSMGE Pan American Conference (2011 Pan-Am CGS Geotechnical Conference), October 2 - 6, 2011, Toronto, Ontario, Canada organized jointly by ISSMGE and Canadian Geotechnical Society, Canada. ; Reviewer for 13th International Conference of International Association for Computer Methods and Advances in Geomechanics (13IACMAG 2011), May 9-11, 2011, Melbourne, Australia organized by IACMAG, USA.; Reviewer for Sponsored Research Project Proposal of 2011-2012 for SERC Division of Department of Science and Technology (DST), Govt. of India.; Member of Technical Committee TC 203 on Geotechnical Earthquake Engineering of International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE), London, U.K.; Technical Advisory Committee (TAC) Member, 4th International Conference on Grouting and Deep Mixing (Grout2012) during February 15 – 18, 2012, New Orleans, Lousiana, USA, jointly organized by Deep Foundations Institute (DFI) and International Conference Organization for Grouting (ICOG), USA.; 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.

Dasaka, S.Murty
Reviewer for Journal of Geotechnical Geoenvironmental Engineering (ASCE), Indian Geotechnical Journal, International Journal of Earth Sciences and Engineering.

Deo, M.C.
Editor-in-chief, 'International Journal of Ocean and Climate Systems',; Chairman, Editorial Board, ISH Journal of Hydrulic Engineering; Member, Editorial Board, Journal of Advances in Civil Engineering; Editor, Special issue of the ISH Journal of Hydraulic Engineering -2011; Independent Director, Konkan Railways; Member, Editorial Board, International Journal of Ships & Offshore Structures, Taylor & Francis; Member, Editorial Board, Open Ocean Engineering Journal, Bentham Press, UK. ; and member of : Maharashtra Coastal Zone Management Authority; Hydrology Project Group, Govt. of Maharshtra; Scientific Advisory Committee, CWPRS, Pune; Scientific Advisory Committee, National Institute of Ocean Technology, Chennai; Project Management Board, NIOT, Chennai; and Board of Governors, SPCE, Mumbai;

Eldho, T.I.
Associate Editor of International Journal of Ecology and Development.

Editor-in-Chief of the Journal "International Journal of Water Resources and Environmental Management" published by Research Science Press.

Associate Editor ISH Journal of Hydraulic Engineering, Taylor & Francis.

Editor, Journal of Civil Engineering & Sciences; Reviewed research papers for several Journals such as: Journal of Water Management, Institution of Engineers, UK; International Journal of Water and Environmental Management; Journal of Water Resources Management; International Journal of Ecology & Development; Journal of Environmental Modeling & Software; ASCE Journal of Practice of Hazardous, Toxic, and Radioactive Waste Management; ASCE Journal of Irrigation & Drainage; ISH Journal of Hydraulics Engineering; Journal of Institution of Engineers (India) – Civil Engineering Section; ASCE Journal of Hydrologic Engineering; ASCE Journal Environmental Engineering; Journal of Geological Survey of India; Journal of Earth System Science; Internal Journal of Numerical Methods in Fluids; Hydrological Sciences Journal; Journal of European Water; Journal of Hydro-environment Research; Journal of Natural Hazards; Journal of Pedosphere; Journal of Water Soil Research; Journal of Waterway, Port, Coastal, and Ocean Engineering; Journal of Current Sciences; International Journal of Engineering Analysis with Boundary Elements.

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

Gopal Rao K
AICTE-NBA Accreditation expert team member.

Gupta, Kapil
Member -UNESCO Working Group: Sustainable Urban Water Strategies, VII IHP, 2008-2013; Editorial Board: Urban Water Journal; Advisor, National Disaster Management Authority, Government of India, New Delhi; and Expert committee on drafting the "Urban Drainage Manual", CPHEEO, Ministry of Urban Development, Government of India, New Delhi.

Ghosh S
Review of manuscripts submitted to various journals: ASCE J. of Structural Engineering; ASCE J. of Bridge Engineering; Journal of Steel and Composite Structures; ISET J. of Earthquake Technology; Scientific Research and Essays.

Juneja, A.
Reviewer of Geotechnical Testing Journal, ASTM; Journal of Materials in Civil Engineering, ASCE; Ground Improvement, ICE; Soils and Foundations, JGS; Canadian Geotechnical Journal, NRC Research Press; HKIE Transactions.

Janga Reddy, M.
Reviewed technical papers for several Journals such as: Journal of Hydrologic Engineering (ASCE); Hydrological Processes; Water Resources Management; Environmental Modeling and Software; Water Management Journal, Journal of Earth Science and Systems; and International Journal of Advances in Engineering Sciences and Applied Mathematics, Applied Soft Computing, Journal of Hydroinformatics, J. of Water Resources Planning and Management.

Jangid, R.S.
Reviewer for research papers for several journals such as, ASCE; Journal of Structural Engineering, International Journal of Physical Sciences, International Journal of Structural Stability and Dynamics, and Journal of Engineering for the Maritime Environment. Journal of Vibration and Control, Marine Structures, Mechanical Systems and Signal Processing, Structural Control and Health Monitoring, Soil Dynamics and Earthquake Engineering.
Member of Editorial Boards such as: Open Ocean Engineering Journal; Open Construction and Building Technology Journal; Earthquakes and Structures Journal; and Independent Director, ETC Network Limited.

Jothiprakash, V.
Executive Council Member (2012-2014) Indian Society for Hydraulics, Pune; and First Adhoc Executive Council Member (2011-2012) International Ground Water Committee (IGWC).

Krishna Rao, K.V.
Member of the Panel for Sustainability, CED 46:P19, Part 11 - Approach to Sustainability, National Building Code 2005, Bureau of Indian Standards; Member of the IRC Technical Committee on Transport Planning, Traffic Engineering & Road Safety (H-1) ; and Member of the IRC Technical Committee on Urban Roads (H-8)

Patil, G. R.
Reviewer of Journal of Infrastructure Systems, Transportation Research Record, Transportmetrica, Journal of Advanced Transportation, Research in transportation economics, IATSS Research; reviewed research Grant Proposal for Fonds de recherche du Québec – Nature et Technologies, Canada

Prakash, Nanthagopalan.
Reviewer for Indian Concrete Institute, KSCE Journal of Civil Engineering, CSIR - Extra Mural Research, Indian Journal of Engineering and Material Science, Sadhana - Academy Proceedings in Engineering Science.

Rao, E. P.
Reviewer of Water Resources Management, Springer.

Rastogi. A. K.
Reviewer of Natural Environment Research Council (NERC) UK – India Project - "The structure and dynamics of groundwater systems in north-western

India under past, present and future climates"; DST Research Proposals "Pathogen transport in subsurface: Analysis and Estimation of Transport Parameters" Department of Civil Engineering, IIT Roorkee ; DST Research Proposals "Fourier analysis and development of 2-dimensional finite element schemes for shallow water equations and transport-related systems" of Dr Jagdeesh Anmala, Department of Civil Engineering, Birla Institute of Technology & Science, Hyderabad. SR/S3/MERC/001/2011; DST Research Proposals "Studies on Sea Water Intrusion in Coastal Aquifers of Visakhapatnam – Kochcherla coast, Andhra Pradesh using Time Domain Electromagnetic methods" of Prof P Rama Rao, Andhra University, Visakhapatnam. Also member of Advisory Committee, Dept. of Civil and Environment Engineering, VJTI, Mumbai; Board of Studies of Dept. of Civil and Water Management Engineering SGGS; Institute of Engineering and Technology – Nanded; Expert Panel – Indian National Committee on Groundwater, Govt. of India; and Expert Panel – Indian National Committee on Hydraulics, Govt. of India; Expert Member - BARC/ Department of Atomic Energy (DAE)/ Board of Research in Nuclear Sciences (BRNS)-Technical Program Discussion Meeting (TPDM) to review the protocol on Hydro-geological Studies.

Raje D
Reviewed papers for international journals such as: Journal of Earth System Sciences, Journal of Hydraulic Engineering, Climatic Change, Hydrological Processes, Water Resources Management.

Singh, D.N.
Member of several editorial boards such as: International Journal of Geomechanics, ASCE; Geomechanics and Geoengineering (Taylor & Francis); Korean Society of Civil Engineering (KSCE) Journal of Civil Engineering; International Journal of Geotechnical Engineering; Indian Geotechnical Journal; and Acta Geotechnica Slovenica.

Subimal Ghosh
Reviewer of Water Resources Research, Journal of Geophysical Research, Geophysical Research Letters, Journal of Hydrology, Journal of Hydrologic Engineering, and many more Involved in the activities of Information Technology Research Academy- Water, a part of Department of Information Technology.

Involved in writing state of the art report on "Climate Change and Water" for Ministry of Water Resources, Government of India and reviewed proposals for Ministry of Water Resources.

Vedagiri. P
Reviewer: ASCE Journal of Transportation engineering, Journal of Transport, Journal of Public Transport, ASCE Journal of Computing in Civil Engineering, Journal of Advanced Transportation.

Faculty Members and their Specializations

1. **Ajit Srividya**
   Structural reliability, Optimization, Quality systems

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

3. **Banerji, P.**
   Structural engineering: Earthquake analysis, Risk assessment, Artificial neural networks, Nuclear structures.

4. **Banerjee S**
   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.

5. **Balaji, R**
   Ocean/coastal engineering, coastal structures, modeling of coastal processes.

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

7. **Choudhury, D.**
   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, Soil Dynamics, Machine Foundations, GIS-GPS based Hazard analysis, Soil Liquefaction, Seismic Microzonation, Centrifuge Modeling, Numerical and Analytical modeling of geotechnical problems.

8. **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.

9. **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)

10. **Desai, Y.M.**
Structural engineering: Wind induced vibrations, Computational mechanics, Nonlinear analysis, Finite elements, Parallel computing, Fiber reinforced polymer composites,
Composites in construction.

11. **Dewaikar, D.M.**
Geotechnical engineering: Offshore foundations, Ground improvement, Seepage.

12. **Dhingra, S.L.**
Transportation systems engineering: Modeling, Simulation, Economics, Environmental impact assessment, GIS, Expert systems, Artificial intelligence, Genetic algorithms, Fuzzy set theory.

13. **Eldho, T.I.**
Water resources engineering: Groundwater flow, pollutant transport, remediation – numerical & experimental investigations Computational fluid dynamics – Incompressible viscous flows, shallow water flow, estuary dynamics, pollutant transport Watershed management – applications of numerical models, Geographical Information Systems, Remote sensing.

14. **Ghosh Siddhartha**
Structural engineering: Performance-based seismic design, Reliability-based seismic design, Plastic design of steel structures, Analysis and design of special plate shear walls.

15. **Gopal Rao, K.**
Remote sensing: Digital image processing (DIP) of multispectral,thermal and microwave data, Digital elevation modelling (DEM), Geographic information systems (GIS), Artificial neural networks (ANN), Applications of RS, GIS, DEM and ANN in hydrology.

16. **Goyal, A**
Structural engineering: Base isolation systems and energy absorbing devices, Earthquake analysis and design, Liquid storage tanks, Bridges, Vibration control of structures, Service life assessment of buildings.

17. **Gupta Kapil**
Water resources engineering: Urban water supply systems, Urban drainage, Urban water infrastructure management, Flood Protection structures, Computational fluid dynamics, Optimization, Environmental impact assessment, Water quality analysis and modeling, Constructed wetlands, Urban disaster management.

18. **Inamdar, M.**
Structural engineering: Solid mechanics, Cellular adhesion and motility, Mechanics of soft materials, Dissipation in structural and mechanical systems.

19. **Janga Reddy Manne**
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.

20. **Jangid, R.S.**
Structural engineering: Structural mechanics, Structural dynamics and earthquak 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.

21. **Jothiprakash, V.**
Water resources engineering: Water resources systems analysis, Reservoir operation, Policy issues, Multi-objective analysis, Stochastic hydrological modeling, Irrigation water management.

22. **Juneja A**
Geotechnical engineering: In-situ and laboratory engineering properties of soil, Numerical and physical modeling in geotechniques, Earthwork, Ground improvement.

23. **Kant Tarun,**
Structural engineering: Solid mechanics, Plates, Shells, Fiber reinforced polymer composite laminates, Higher order theories, Thermal stresses, Transient dynamic techniques, Finite elements, Numerical techniques, Polymer composites in construction, Composite mechanics, Computational mechanics.

24. **Krishna Rao, K.V.**
Transportation systems engineering: Travel demand modeling, Evolutionary algorithms, Neural networks and GIS in transport planning, Traffic design and analysis.

25. **Mandal, J.N.**
Geotechnical engineering: Geosynthetics for civil engineering construction.

26. **Pani, B.S.**
Water resources engineering: Diffusion of jets and plumes, Multiple diffusers, Offshore pipe-lines, Scour problems, Cooling water structures.

27. **Rao, E.P.**
Remote sensing: Remote sensing applications to water resources, Runoff modeling, Water distribution systems optimization.

28. **Rastogi, A.K.**
Aquifer Remediation Strategies, Inverse Modeling of the Aquifers and Auto Calibration of Field Models, Solute Transport Modeling involving Hydrodynamic Dispersion in Aquifers, Ground Water Flow Modeling of Unconfined and Confined Aquifers, Well Hydraulics Modeling, Groundwater Systems Planning and Management and Coastal Aquifer Hydrodynamics Modeling

29. **Patil G. R**
Transportation systems planning, Network optimization, Freight transportation modeling, Traffic operations, Demand modeling, Traffic emissions

30. **Prakash, Nanthagopalan**
High performance concrete, Sustainable construction materials, Mineral and chemical admixtures in concrete, Rheology of cement based materials.

31. **Raje, D.**
Water resources engineering: Stochastic hydrology, uncertainty quantification, water resources systems, climate change impacts and adaptation

32. **Ravi Sinha**
Structural engineering: Earthquake engineering, Vibration control and isolation, Structure rehabilitation and condition monitoring, Disaster management.

33. **Singh, D.N.**
Geotechnical engineering: Environmental geotechnics, Radioactive waste disposal, Solid waste utilization, Geotechnical centrifuge modeling.

34. **Subimal Ghosh**
Water resources engineering: Uncertainty modeling, Water resources systems, Hydroclimatology.

35. **Tom.V. Mathew**
Transportation systems engineering: Traffic flow modeling and simulation, Transportation network optimization, control and management.

36. **Venkatachalam, G.**
Geotechnical engineering: Finite element analysis, Digital image processing, Digital terrain modeling, Centrifuge, Numerical and GIS modeling of landslides.

37. **Vedagiri P.**
Pedestrian Flow Modeling, Traffic Flow Modeling and Simulation, Traffic Monitoring, Management and Control, Road Safety Audit, Public Transit System Design and Operations.

38. **Viswanadham, B.V.S.**
Geotechnical engineering: Centrifuge modeling, Soil reinforcement, Ground improvement, Environmental geotechnics-waste materials' behaviour, waste containment systems.

Computer Science & Engineering

Introduction

The Department of Computer Science and Engineering at IIT Bombay is one of the largest departments in the country. The department's teaching and research activities are handled by 40 faculty members. Currently, about 100 Ph.D. students, more than 200 M.Tech. students and over 250 B.Tech. students form the student pool of the department. While several research activities are pursued by individual faculty members and external collaborators, the deparment houses about ten research labs spanning the areas of networks, databases, embedded systems, computer graphics, language technologies, machine learning and geospatial systems.

Several students of the department won distinguished awards and honours during the year, as follows: Pratik Jawanpuria was among IBM's PhD fellowship recipients in 2012, Kartik Ramchandra and Rijurekha Sen won the first and second prizes, respectively, at the Ph.D. poster session at the Microsoft Research TechVista 2012 Symposium. Karthik Ramachandra received the Yahoo! Key Scientific Challenges Program award and was one among five in India who received the Microsoft Research (India) Ph.D. Fellowship award for 2011.

Faculty members were also honoured in various ways this year. Pushpak Bhattacharya delivered a keynote address at the International Joint Conference on Natural Language Processing, which is a flagship event in NLP, focusing on Asian languages. This year's IJCNLP was held in Chiang Mai, Thailand, in November 2011.

Academic Programmes

Degrees Awarded	
B.Tech.	: 36
M.Tech.	: 84
Ph.D.	: 7
Dual Degree	: 21

The Fellowship details are as follow:

(i) Microsoft Research India Ph.D. fellowship (2 Nos.); (ii) Microsoft India Research India Pvt Ltd. For Ph.D students (1 No.); (iii) Shantanu Deshpande Scholarship (1 No.) and (iv) TCS Ph.D. Fellowship (1 No.).

R & D Activities

Sponsored Research Projects

Sponsored Projects	**:**	**116**
No. of Ongoing Projects	:	91
No. of New Projects	:	17
No. of Completed Projects	:	8

New Projects

"Development of Techniques and Tools for Formal Verification of Computer Systems with Improved Precision and Scalability." Sponsored by Board of Research in Nuclear Sciences

"Development and Evolution of Sanskrit Word -Net (PHASE II)". Sponsored by Central Institute of Indian Languages.

"India Telco Summit". Sponsored by Conferences on Indiatelco Summit.

"Development of English to Indian Language Machine Translation system (EILMT) PHASE-II". Sponsored by Department of Information Technology.

"Development of Dravidian WordNet: An integrated WordNet for Telugu, Tamil, kannada & Malayalam". Sponsored by Department of Information Technology.

"SPARC: Spectrum Aware Rural Connectivity". Sponsored by Department of Information Technology.

"Development of Radiosonde for Meteorological System". Sponsored by Defence Research & Development Organisation.

"Structural Health Monitoring with Networked Embedded Systems". Sponsored by Department of Science & Technology.

"Rural Technology Action Group(RuTAG)" . Sponsored by Department of Science & Technology.

"Databases and Information Retrieval". Sponsored by Department of Science & Technology.

"Endowment Interest for CSE/KRESIT Department". Sponsored by ENDOINTCSE.

"Entity & Relation Search on the Uncertain Web". Sponsored by GOOGLE.

"IBM Faculty Award 2011 ". Sponsored by International Business Machines Corporation.

"Unrestricted Research Project Grant". Sponsored by Microsoft Research Lab India pvt. Ltd.

"Availability Analysis of Storage Systems". Sponsored by Netapp India Private Limited.

"YAHOO! Fellowship ". Sponsored by YAHOO INC.

"High Quality Domain Specific Statistical Machine Translation System from English to Indian Languages". Sponsored by YAHOO INC.

Completed Projects

"C V Raman International Fellowship Award for African Researchers (Coulibaly Naga)". Sponsored by Federation of Indain Chambers of Commerce and Industry.

"DST/ Understanding Motion: Surface 3D Deformation From Video Data". Sponsored by Department of Science & Technology.

"Development & Evolution of Sanskrit Word-Net". Sponsored by Central Institute of Indian Languages.

"Context-Sensitive Query Redressal Service using Mobile Process Work-flow". Sponsored by Nokia India Pvt. Ltd., Bangalore.

"IBM Faculty Award/IBURG Based Instruction Selection in GCC". Sponsored by IBM.

"Monograph of Business Incubation activities at IITB". Sponsored by Wadhwani Foundation.

"Workshops on Establishing and operating a Business incubator & Marketing Mantra for Techno-Entrepreneurs". Sponsored by Wadhwani Foundation.

"Cross Lingual Information Access (CLIA) System". Sponsoerd by Information Technology.

Ongoing Projects

"High Accuracy Sentiment Analysis with Polarity Marked Resource". Sponsored by America On Line, Bangalore.

"Design and Development of Gigabit Networking Solutions for C&I Applications". Sponsored by Bhabha Atomic Research Centre.

"BRNS/ Analysis of SCADE Lustre models: Runtime Monitoring & Testing". Sponsored by Board of Research in Nuclear Sciences.

"High-Speed Switching Fabric for Transport Networks and Distributed Processor Interconnects". Sponsored by Board of Research in Nuclear Sciences.

"Fiber to the home-key Ingredient Technologies for Energy Conservation and Bridging the Indian Digital divide". Sponsored by Department of Information Technology.

"Development of Indradhanush: An integrated Word Net for Bengali, Gujarati, Kashmiri,Konkani, Oriya,Punjabi & Urdu". Sponsored by Department of Information Technology.

"Virtualized Cloud Computing Infrastructure using Light Trails and very fast switching". Sponsored by Department of Information Technology.

"Network Sanitization". Sponsored by Department of Information Technology.

"Deploying omnipresent Ethernet based data-centers in actual networks - Validation of project periscope". Sponsored by Department of Information Technology.

"PHASE II —Development of Indian Language to Indian Language Machine Translation System (II-IL-MT)". Sponsored by Department of Information Technology.

"Development of Cross Lingual Information Access (CLIA) System Phase II". Sponsored by Department of Information Technology.

"Immersive Digital Heritage". Sponsored by Department of Science & Technology.

"Support for Cloud Computing related research" . Sponsored by International Business Machines Corporation.

"Cloud Collaboratory". Sponsored by International Business Machines Corporation.

"Parallel Computing Research Prospects". Sponsored by Intel Technology India Pvt. Ltd.

"Geo-spatial data base Management- The Ganga River Basin Management Project (GRBMP)". Sponsored by Ministry of Environment & Forests.

"OSCAR++ (Open Source Courseware Animations Repository)". Sponsored by Ministry of Human Resource Development.

"Microsoft Research India Travel Grant". Sponsored by Microsoft Research Lab India pvt. Ltd.

"IITB-NSN: Next Generation Optical Access". Sponsored by Nokia Siemens Networks.

"Searching the Unstructured Web With Structured Queries". Sponsored by SAP Labs India Private Limited.

"Development of Multilingual Resources and Technologies for Indian Languages". Sponsoerd by Xerox Corporation.

"YAHOO INC./YAHOO Research Grant 2010". Sponsored by YAHOO INC.

"Bridging Query Intents to Catalogs and Annotated Documents". Sponsored by YAHOO INC.

"ITB-CommTel Multi-Service Transport Platform (MSTP) Development (Commtel Networks Pvt. Ltd.,Mumbai)". Sponsored by Commtel Networks Pvt. Ltd.

"GCC Resource Center". Sponsored by Department of Information Technology.

"Indian Language Corpora Initiative". Sponsored by Department of Information Technology.

"Second Generation Area Traffic Control System (CoSiCoSt2G)". Sponsored by Department of Information Technology.

"Real-Time Transit Trip Planner and Route Information System". Sponsored by Department of Information Technology.

"PERISCOPE: Pragmatic Efficient Reliable Internet working solution using Consumer-Centric Omnipresent Ethernet". Sponsored by Department of Information Technology.

"Energy & Performance Efficient Manet Routing Protocols for Tactical Environment". Sponsored by Defence Research & Development Organisation.

"India-UK Advance Technology Centre (IU-ATC) of Excellence in Next Generatio Networks Systems and Services". Sponsored by Department of Science & Technology.

"DST/ Advanced Research Lab for Geospatial Information Science and Engineering". Sponsored by Department of Science & Technology.

"SwarnaJayanti Fellowship for Large Scale Gene Expression Analysis on HIgh Performance Parallel Computers for Functional Genomics and Systems Biology". Sponsored by Department of Science & Technology

"GEYSERS: Generalized architecture for dynamic infrastructure services". Sponsored by European Commission.

"PROF. Umesh Bellur / Virtual Machine Placement in Infrastructure Clouds". Sponsored by International Business Machines Corporation.

"Empowerment of Student & Teachers through Synchronous & asynchronous instruction". Sponsored by Ministry of Human Resource Development.

"E-Yantra : Roboot Enhanced Teaching of Subjects in Engineering Colleges - Centrally Sponsored scheme of National Mission of Education through Information & Communication Technology". Sponsored by Ministry of Human Resource Development.

"Empowerment of student and teachers through synchronous and asynchronous instruction". Sponsored by Ministry of Human Resource Development.

"Project OSCAR++, Open Source Course-ware Animation Repository for higher education". Sponsored by Ministry of Human Resource Development.

"Assimilation of open source software in science and engineering education". Sponsored by Ministry of Human Resource Development.

"Creation of Machine translation tools and resources for English to Dravidian Languages". Sponsoerd by Ministry of Human Resource Development.

"Developing suitable pedagogical methods for various classes, intellectual calibers and research in e-learning". Sponsored by Ministry of Human Resource Development.

"Microsoft Research India Outstanding Young Faculty Award". Sponsored by Microsoft Research India Outstanding Faculty Award(under IRCC).

"Logical Methods for Compositional Shape Analysis". Sponsored by Microsoft Research Lab India pvt. Ltd.

"Unrestricted Grant for Research Support (M/s. Microsoft Research Lab India Pvt. Ltd., Bangalore)". Sponsored by Microsoft Research Lab India pvt. Ltd.

"Microsoft Grant (Microsoft Research Lab India Pvt. Ltd, Bangalore)". Sponsored by Microsoft Research Lab India pvt. Ltd.

"StrucFus (Infrastructure for information fusion System)". Sponsored by VETENSKAPSRADET.

"Interference and Affinity Characterization of VMs for Server Consolidation in Infrastructure Clouds (Yahoo Software Development India Pvt.Ltd., Bangalore)". Sponsored by YAHOO INC.

"Yahoo Research Grant (Yahoo! Inc.)". Sponsored by YAHOO INC.

"Development of tool for formal verification of VHDL based data and control dominated designs used in safety critical systems". Sponsored by Board of Research in Nuclear Sciences.

"Development of NE-Wordnet : An Integrated Wordnet for North East Languages- Assamese, Bodo, Manipuri & Nepali". Sponsored by Department of Information Technology.

"National Programme on Perception Engineering". Sponsored by Department of Information Technology.

"Euro-India ICT Co-Operation". Sponsored by European Commission.

"Semantic Linkage Between the Web, Internet and Wikipedia: Discovery and Exploitation in Search and Aggregation". Sponsored by HP Labs.

"2008 IBM Faculty Award". Sponsored by International Business Machines Corporation.

"Analyzing programs manipulating recursive data structures". Sponsored by Microsoft Research Lab India pvt. Ltd.

"Research Collaboration on Mobile and Wireless Systems, with Microsoft Research India (MSRI)". Sponsore by Microsoft Research Lab India pvt. Ltd.

"Rural Connectivity and applications,Wireless Communications and Networking". Sponsored by Tata Teleservices Ltd., Mumbai.

"Information Aggregation from tables on the Web". Sponsored by Yahoo Inc.

"Design and Development of a Real Time Operating System (RTOS) for Safety Critical Application" . Sponsored by BARC.

"IBM Faculty Award / Building a self-aware and self-tuning distributed system using queuing theoretic and control theoretic approaches". Sponsored by IBM.

"IBM Faculty Award". Sponsored by IBM.

"IBM Faculty Award, / Integrating Indian Language processing resources and tools and semantic search capabilities with the UIMA Platform". Sponsored by IBM.

"IBM Faculty Award/ Approximate search and coverage based verification techniques for flattened circuits with locally specified reference models". Sponsored by IBM.

"Microsoft Award// Scalable annotation, search & aggregation of semistructured graph and text data models". Sponsored by Microsoft.

"Intelligent Power Grid Initiative in India". Sponsored by Private Organisations.

"Microsoft India Distinguished Research Award / Linguistic Data Management of Indian Language Resources". Sponsored by Microsoft India.

"Large Scale Application Development and Knowledge Dissemination in Natural Language Processing and Text Mining (HP Labs, Bangalore)". Sponsored by HP Labs.

"Formal verification of Akash onboard process". Sponsored by Defence Research & Development Organisation.

"Development of Indian Language to Indian Language Machine Translation System (Il-IL MT) : Consortium Leader : IIIT Hyderabad". Sponsored by Information Technology

"IBM Faculty Award" Sponsored by IBM.

"PH.D Proj. of Dharamendra Yadav "CCS & Its Application..Modelling" I (M/s. IBM India pvt. Ltd.) Sponsored by IBM Sponsered Student Projects.

"Metamodelling & Architecure .. (M/s. IBM India Pvt. Ltd.) Sponsered by IBM Sponsered Student Projects.

"Formal Verification of Software Systems (M/s. Microsoft India (R&D) Pvt.Ltd., Hyderabad)"Sponsored by Microsoft India.

"TCS-IIT Bombay Laboratory for Intelligent Systems". Sponsored by TCS.

"Formal Verification of Large State Transition System" (M/s.General Motors India Pvt. Ltd., Bangalore). Sponsored by General Motors India Pvt.Ltd.

"Special Manpower Development Programme for VLSI Design and Related Software (SMDP-II)". Sponsored by Department of Electronics.

"Building Check-Dams for Drinking Water: A Teaching and Research Initiative". Sponsored by Donation.

"RTL Symbolic Simulation". Sponsored by International Collaboration Projects.

"IBM Faculty Awards-IBM Global Services India Pvt. Ltd". Sponsored by IBM.

"Developmental Informatics". Sponsored by Private Organisations.

"Open Source Software (M/s.IBM Global Services India Pvt. Ltd., Bangalore)". Sponsored by IBM.

"Association For Computing Machinery -International Collegiate Programming Contest -IBM Canada Ltd". Sponsoredby IBM.

"Exchange of Ideas on Data Mining and Data Cleaning Projects-Microsoft Resaerch" Sponsored by Microsoft.

"Interest of Endowment Fund of the CFDVS". Sponsored by Donation.

"Centre for formal Desing and Verification of software". Sponsored by BRNS.

Consultancy Projects

No of Jobs	**20**
Faculty involved	**11**

Extension Activities

The extension activities, organised by the faculty and students of the department, consisted of conferences, workshops and short-term CEP courses, as follows :

Conferences

FSTTCS 2011 : The 31st Foundations of Software Technology and Theoretical Computer Science (FSTTCS) conference was held in IIT Bombay from December 12 to 14, 2011.

The technical programme of the conference included 37 technical papers and six invited talks. There were also two co-located events: a pre-conference workshop (Dec 10-11, 2011) on Finite and Algorithmic Model Theory, and a post-conference workshop (Dec 15-16, 2011) on Breakthroughs in Theoretical Computer Science.

FIRE 2011: Workshop on IR Evaluation : The Forum for Information Retrieval Evaluation (FIRE) was set up in 2007 to evaluate IR in Indian languages. The annual conference of this forum was held at IIT Bombay on 2-4 Dec, 2011. Thirteen invited speakers from all over the world, who are experts in the field of IR, addressed the delegates who came from leading search industries like Microsoft, Google, HP Labs, Xerox etc., and also from academia and the Ministry of Information Technology.

Workshops

Workshop on Essential Abstractions in GCC : GCC, an acronym for GNU Compiler Collection, is a compiler generation framework which generates production quality optimizing compilers from descriptions of target platforms. The workshop was conducted from June 30 to July 3, 2011.

WIVCC-2012 Second Workshop on Issues in Virtualization and Cloud Computing

Virtualization technology - enabled cloud computing has been making rapid strides in provisioning, usage and management of large-scale systems. As popularity and applications of these techniques increase, there is increasing interest in the area, both from the academic research community and the industry. WIVCC-2012 was conducted on February 25, 2012.

CEP Short-term Courses

The following courses were offered under CEP : Introduction to Robotics; Essential Abstractions in GCC 11; Advanced C++ Programming; Introduction to Robotics; Introduction to Robotics; Introduction to Robotics; Course for Coordinators; Advanced C++ Programming; Introction to Functional Programming with HASKELL; Course for Coordinators; Abstractions and Pattern Oriented Design; Writing Effective Conference Papers; and Introduction to Robotics.

Visitors to the Department

The follwoing visited the department and delivered lectures :

Dr. Dilys Thomas and Shri. Vijayanand Banahatti, Tata Research Development and Design Center (TRDDC), on "R&D at Systems Research Lab, TRDDC and Contemporary Problems in Computer Science Especially Databases".

Dr. Ashwin Machanavajjhala, Yahoo! Research, on "A Holistic Approach to Web Scale Information Extraction".

Prof. Sandhya Dwarkadas, University of Rochester, on " Scalable Support for Data Sharing on Multi-Core Platforms".

Dr. Shrihari Vasudevan, University of Sydney, on "Gaussian Process Modeling of Large Scale Terrain".

George Varghese , University of California San Diego, on "Efficient Set Reconciliation and Measuring Traffic at all Time Scales".

Prof. P. Sadayappan, Ohio State University, on "Domain-Specific Compiler Optimization for High-Performance Computing".

Ed Cutrell, Microsoft Research India, on "Innovations in Computing for Global Development at Microsoft Research".

Prof. Aravind Srinivasan, University of Maryland, College Park, on "Constructive Aspects of the Lovasz Local Lemma and their Applications".

Dr. S. Akshay, National University of Singapore, on "Model Checking Time Constrained Scenario-based Specifications".

Dr. S. Akshay, National University of Singapore, on "Approximate Methods for Probabilistic Inference in Dynamic Bayesian Networks".

Dhananjay Muli, working on improving MGNREGA implementation for Maharashtra state, on "e-Governance in MGNREGA implementation".

Jaikumar Radhakrishnan, TIFR Bombay, on "Primality testing".

Dr. Kapil Vaswani from Microsoft Research India, on "Walking on the Cloud: Programming Models for Scalable Distributed Applications".

Basant Verma, from Yahoo group, on "Hadoop Architecture and the MapReduce Framework".

Dr. Chien-Chung Huang, Max Planck Institute, on "Near-Popular Matchings in the Roommates Problem".

Dr. Surendra Guntur, NXP Semiconductors, Netherlands, on "Performance Density Exploration of Heterogeneous Multicore Architecture".

Dr. Arnab Nandi from Michigan, on "Distributed Cube Materialization on Holistic Measures".

Mr. Sanjeev Kumar & Mr. Alex Gorelik, Informatica, on "Challenges and Opportunities in the New, Big-Data Driven World".

Prof. R. Rama, Dept. of Mathematics, IIT Madras, on "Generalised Sequential Crossover of Words and Languages".

Prof. Hans-Arno Jacobsen, MSRG.org, University of Toronto, on " GPX-Matcher: A Generic Boolean Predicate-based XPath Expression Matche".

Dr. Chandrakant K. Raut, PhD in Information Engineering from Cambridge University, on "Discriminative Adaptive Training and Adaptation for Speech Recognition".

Dr. Anirban Dasgupta, Yahoo! Labs, on " Faster Projections and Sketches".

Dr. Aranyak Mehta, an IIT Bombay alumnus (BTech 1996-2000), Google Research, on "Online Matching and Adwords".

Dr. Shuvendu Lahiri, Microsoft Research, Redmond, on "Underspecified Harnesses and Interleaved Bugs".

Prof. Kaushik Chowdhury, Assistant Professor, Electrical and Computer Engineering Department at Northeastern University, Boston, on "Protocol Design Challenges and Applications for Distributed Cognitive Radio Networks".

Prof. Larry Davis (http://www.umiacs.umd.edu/~lsd), on "Context in image and video understanding".

Prof. Rajit Manohar, Dept. of Electrical and Computer Engg., Cornell University, on "High Performance Reconfigurable Logic".

Prof. Prabhat Ranjan, Dhirubhai Ambani Institute of Information and Communication Technology, Gandhinagar (India), on "Development of Real World Sensor Network Applications".

Mr. Anupam Singh, VP Technology of MarketShare and Founder/CTO of Jovian, on "JovianDATA: A Multidimensional Database for the CloudData".

Mr. V. G. Vinod Vydiswaran, University of Illinois at Urbana Champaign, on "Can you believe what you read online? Modeling and Predicting Trustworthiness of Online Textual Information".

Mr. Venkat Amirisetty, Informatica, on " Complex Event Processing - Usecases, Architecture and Challenges".

Mr. Karthik Swaminathan, Pennsylvania State University, on "Use of Emerging Technologies in the Design of Low Power Processor Architectures".

Frans Kaashoek (MIT), MIT, on "The Multicore Evolution and Operating Systems".

Prof. Jim Hendler, Rennselaer Polytechnic Institute, USA, on "Broad Data: The Emerging Data Science Challenge on the Word Wide Web".

Prof. Rohit Parikh, Brooklyn College and CUNY Graduate Center, on "Applications of Epistemic Logic".

Prof. Pramod Chandra (PCP) Bhatt, Chairman, Vidha Software Solutions, on "In Memory Data Processing and Management".

Mr. Bharath Balasubramanian, University of Texas at Austin, on "Fault Tolerance in Distributed Systems: A Coding-Theoretic Approach".

Prof. Laxmikant Kale, University of Illinois at Urbana-Champaign, on "Essential Techniques for Developing Efficient Petascale+ Applications".

Craig Gotsman, Computer Science Department, Technion - Israel Institute of Technology, on "Modeling 3D Meshes with Planar Faces".

Prof. Ran Ginosar, Dept. of Electrical Engg. & Computer Science at the Technion, Israel, on "The Plural Architecture: Shared Memory Many-cores with Hardware Scheduling".

Prof. Ran Ginosar, Dept. of EE & CS at the Technion, Israel, on "Post-graduate and post-doctoral studies at the Technion in Israel".

Prof. Tova Milo, Tel Aviv University, on "Mob Data Sourcing".

Dr. Budhendra L. Bhaduri, Geographic Information Science & Technology Group, Oak Ridge National Laboratory, on "Computational Approaches for Spatio-temporal Data Driven Modeling and Visualization".

Dr. Budhendra L. Bhaduri, Geographic Information Science & Technology Group, Oak Ridge National Laboratory, on "Computational Approaches for Spatio-temporal Data Driven Modeling and Visualization".

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

Adsul Bharat
FSTTCS 2011.

Joshi Rushikesh K
5th India Software Engineering Conference, IIT Kanpur Feb 22-25, 2012

Software Engineering Education Workshop (SEEW) at ISEC 2012, IIT Kanpur

Sarda Nandlal L, Khan M. R., Chaure V., Sarda N. L.
"A Framework For Web-Based Gis Applications", *SPRS Workshop on Pervasive Web Mapping Geoprocessing and Services*; 10-12 August 2011; Simon Fraser University (SFU), Burnaby, Canada

Panchal H., Khan M. R., Sengupta S., Sarda N. L.
"GIS-based Smart Campus System using 3D Modeling", *Geospatial World Forum*; 18-21 January 2011; Hyderabad, India

Mukta Paliwal, Patwardhan A, Sarda N. L.
"Analyzing Tropical Cyclone Tracks of North Indian Ocean", *2nd Intl Conf on Computing for Geospatial Research & Applications*, COM.Geo 2011, Washington DC, May 23-25, 2011.

Abhijat Arun Abhaynkar, Anand Patwardhan and Arun Inamdar
"Extraction of Flooded Areas due to Severe Storm using Envisat ASAR Data and Discriminant Approach", at *Geomatrix 2011*, CSRE, IIT Bombay.

Bhattacharyya Pushpak
"Association of Computational Linguistics", *ACL 2011*, June 2011, Oregon, USA.
"Empirical Methods in Natural Language Processing", *EMNLP 2011*, July 2011, Edinburgh, UK.
International Joint Conference on Natural Language Processing (IJCNLP 2011), November 2011, Chiang Mai, Thailand.
International Conference on Natural Language Processing (ICON 2011), Dec 2011, Chenai, India.
International Conference on Global Wordnets (GWC 2012), Jan 2012, Matsue, Japan.
International Conference on Intelligent Text Processing and Computational Intelligence (CICLING 2012), Mar 2012, New Delhi, India.

Chaudhuri Parag
"Motion Graphs in Blender", with Mihir Gokani and Parag Chaudhuri, *Blender Conference 2011*, Amsterdam, October 2011.

J.Saketha Nath
"Efficient Rule Ensemble Learning using Hierarchical Kernels", with Pratik and Ganesh, at the *28th International Conference on Machine Learning (ICML-2011)* held in Bellevue, Washington, USA, from June 28 through July 2, 2011.

J.Saketha Nath and Pratik
Pratik presented a paper "Multi-task Multiple Kernel Learning" at the *2011 SIAM International Conference on Data Mining* held in Arizona, USA from April 28-30, 2011.

Khedkar Uday
"Tutorial on Essential Abstractions in GCC" at *International Symposium on Code Generation and Optimization (CGO)*, Chamonix, France.

"Tutorial on GCC for Parallelization in 17th ACM SIGPLAN", *Symposium on Principles and Practices on Parallel Programming (ACM PPOPP'12)*

Raman Bhaskar
Fourth International Conference on COMmunication Systems and NETworkS (COMSNETS), Bangalore, India, January 2012

S.Krishna *ICDCIT 2011* at Bhubaneshwar.
Sahoo Anirudha
IEEE International Symposium on World of Wireless, Mobile and Multimedia Networks (WoWMoM), Lucca, Italy, June 2011.

ACM International Conference on Cognitive Radio and Advanced Spectrum Management (CogART), Barcelona, Spain, October 2011.

S.Sudarshan
International Conference on Data Engineering (ICDE) 2011 Hannover, Germany.
International Conference on Very Large Databases (VLDB) 2011, Seattle, WA, USA.
International Conference on Management of Data (COMAD), Bangalore, Dec 2011.

Conferences/Symposia/Workshops/ Seminars (Coordinated/Chaired)

Chakraborty Supratik
Program Committee co-Chair and Organizing Committee Chair, *FSTTCS 2011* (at IIT Bombay)

Bhattacharyya Pushpak
Area Chair, "Semantics", *International Joint Conference on Natural Language Processing*, Nov 2011, Chiang Mai, Thailand.

Chakraborty Supratik
Program Committee co-Chair of two international conferences: *FSTTCS 2011*
Organizing Committee Chair of *FSTTCS 2011*
Program Committee Member: *CAV 2011, SPIN 2011, ICTAC 2012*

Chebrolu Kameswari
Programme co-Chair *NSDR 2012*, Technical Program Committee Member: *IMC 2012, MOBISYS 2012, NETHEALTH 2012, SECON 2011, SENSYS 2011*

J.Saketha Nath
Program Committee Member for *twenty-Sixth Conference on ArtificialIntelligence (AAAI-12), First International Conference on Pattern Recognition Applications and Methods (ICPRAM-12).*

Joshi Rushikesh K
Organizing Member of *Workshop on Software Engineering Education at ISEC 2012*, IIT Kanpur Steering Committee Member, *ISEC Conference*.

Gopalakrisnaswami Nagaraja
Technical Program co-Chair of COMSNETS 2012 and General co-Chair of *COMSNETS 2013.*

Sahoo Anirudha
Technical Program Committee (TPC) Member of (i) *IEEE GlobeCom 2011* and (ii) *IEEE ICC 2011*.

Sarawagi Sunita
Research Track co-Chair, *VLDB 2011 Conference*.

Sharat Chandran
Program Co-Chair, *Mysore Park Workshop on Computer Vision*
Top Tier Program Committee Reviewer: WACV, ACCV , CVPR, ICCV, Eurographics
Other Program Committee reviewer: NCC, NCV-PRIP-G
Reviewer of Proposals: DST
GeoICT PAMC member (DST)

Invited Lectures

Bhattacharyya Pushpak
"Unsupervised Morphology Learning", in *Symposium on Cross-Roads of Language and Technology: Eastern and North-Eastern Indian Perspective,* Society for Natural Language Technology Research (SNLTR), Kolkata, November, 2011.

Chakraborty Supratik
"Syntax vs Semantics in First-Order Logic", Formal Methods Update Meeting, VIT, Vellore and Calcutta Logic Circle, Kolkata

"Travelling the Formal Methods Road: Some Perspective", Dept. of Computer Science and Engineering, IIT Kharagpur

Chaudhuri Parag
"Motion Graphs for Character Animation", *Research Promotion Workshop on Introduction to Graph and Geometric Algorithms*, IIT Guwahati, 21-23 October 2011.

Chebrolu Kameswari
"TDMA- based MAC for High Throughput Bulk Transfer in Sensor Networks" at *UbiComp 2011*, a workshop organized by C-DAC, Bangalore, February 26, 2011.

Khedkar Uday
"What is Research ?" at Father Agnel College, Vashi and at several other places.

Raman Bhaskar
"Expert Lecture in the Refresher Course on Computer Networks", *UIT-RGPV*, Bhopal

Sarda Nandalal L
"Reserach Issues in Spatio-temporal Databases", *International Conference on Innovations and Trends in Applied Computing*, Feb. 1-3, YCCE, Nagpur.

Sharat Chandran
"Point Based Graphics", *NCVPRIPG* Tutorial

"India Digital Heritage - Hampi ", *NIAS Workshop*, Sept 2011

"Shape Spaces", DAIICT, March 15, 2012.

"Features", TCE Madurai, July 5, 2011.

G. Sivakumar
"Data Deluge and Data Enabled Science", *8th National Conference on Recent Advances in Information Technology (READIT),* SIRD, IGCAR, Kalpakkam - 603 102, Dec 2011.

Bhattacharyya Pushpak
Keynote Speech, "Unsupervised Morphology Learning", *2nd Workshop on South and Southeast Asian Natural Language Processing (WSSANLP 2011)*, Chiang Mai, Thailand, November, 2011 (Satellite event of IJCNLP 2011).

"Multilingual Word Sense Disambiguation under Resource Constraint", Presentation of Grenoble Information Laboratory (LIG Presentation), Grenoble, France, 16 June, 2011.

"Multilingual Computation in Indian Languages", Action Meeting: Multilingual and Multifaceted Information Access (MUMIA) of European Cooperation on Science and Technology (COST) (MUMIA Action Meeting), Vienna, Austria, 8 June, 2011.

"Natural Language Processing and Information Retrieval", Seminar at Xerox Research Center, Europe, Grenoble, France, 26 May, 2011.

Chebrolu Kameswari
"Bridging the Connectivity Divide" invited panel at *COMSNETS 2011*, Bangalore, Feb 7, 2011.

Khedkar Uday
"Heap Reference Analysis" at ETH, Zurich, and at other foregin universities.

"Demystifying GCC : Or What the GCC manuals should have told you but they don't!" at University of Cambridge and at the University of Louisiana at Lafayette.

Significant Awards/Distinctions

Bhattacharyya Pushpak
Yahoo Faculty Award, 2011

Ramamritham Krithi
IIT Bombay's H. H. Mathur Award for Excellence in Research in Applied Sciences, 2010

Sahoo Anirudha
Part of the team which received TCOE (Telecom Centres of Excellence) Award for Excellence for Academic Institution.

Sarawagi Sunita
Honorary mention for Best student paper award at the NIPS 2011 conference held at Vancouver in December 2011.

Sarda Nandalal L
Joined as Director on the Board of Andhra Bank, March 2012.

Honorary Work

Apte Varsha
Served as Publications Chair for IEEE COMSNETS 2011.

Bhattacharyya Pushpak
Served as Associate Editor, ACM Transactions on Asian Language Information Processing (TALIP).

Chaudhuri Parag
Served as Editorial Board Member, Journal of Computer Animation and Virtual Worlds
Reviewer, The Visual Computer Journal.

Gopalakrisnaswami Nagaraja
Reviewer of Web Course Contents of Course on Pattern Recognition developed by Prof. Narasimha Murty and colleague under the aegis of NPTEL.

Ramamritham Krithi
Served as Journal Editor-in-Chief of IEEE: Embedded Systems Letters; Springer Real-Time Systems Journal; and several other journals.

Raman Bhaskar
Served as Associate Editor of IEEE Transactions on Mobile Computing and as Area Editor of Computer Communication Review.

S.Krishna
Reviewed papers for journals Theoretical Computer Science and Theory of Computing Systems

Sahoo Anirudha
Reviewed multiple manuscripts in
a) IEEE Transactions on Mobile Computing (TMC)
b) IEEE International Conference PIMRC 2011

G. Sivakumar
Chair, Expert Committee on "Technical Standards for Interoperability Framework for E-Governance in India", set up by the Department of Electronics and Information Technology, Govt. of India.

S.Sudarshan
Served as Associate Editor, ACM Transactions on Database Systems and as Associate Editor IEEE Transactions on Knowledge and Data Engineering.

Reviewer/Program Committee Member:*Proceedings of the Very Large Database Conference, 2012,* and as *ACM SIGMOD Conference on Management of Data 2012*

Faculty Members and their Specializations

1. Bharat Adsul
Formal methods in Concurrency, Logics and Games, Geometric Complexity Theory

2. Srinivas Aluru
Parallel algorithms and applications, bioinformatics and systems biology, combinatories 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
Adaptive Service Orientation, Managing virtualization and server consolidation in Clouds, Adaptive QoS based routing in DEBN

7. Pushpak Bhattacharyya
Natural Language Processing, Mahcine Learnng, Cross Lingual Information Retrieval

8. Moreshwar Bhujade
Hardware verification, Neural networks

9. Supratim Biswas
Parallel and Distributed Processing , Neural Nets , 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 Choudhuri
Computer Animation, Computer Graphics, Geometric Computer Vision, Augmented and Virtual Reality.

13. Kameswari Chebrolu
Wireless and Sensor Networks

14. Om Damani P
Natural Language Processing

15. Dhananjay Madhav Dhamdhere
Distributed Algorithms, Programming Languages, Operating Systems, Optimizing Compilers

16. Ajit A Diwan
Algorithms, Theoretical Computer Science

17. Sridhar Iyer
Mobile Computing, Distributed Systems, Educational Software.

18. Saketha Nath J
Machine Learning, Data Mining, Convex Optimization

19. Rushikesh Krishnakant Joshi
Object Oriented Systems, Distributed Systems, Software Architectures

20. Shashikant Kelkar
Software Engineering And Quality Assurance (Testing and Matrices)

21. Uday Khedkar
Programming Languages, Compilers, Data Flow Analysis.

22. Purushottam Kulkarni
Wireless and sensor networks, virtualization, distributed systems and data dissemination.

23. Nutan Limaye
Algorithms and Complexity Theory

24. Bernard Menezes
Information Appliances, Electronic Commerce, Java Security, Parallel Computing, Time Series Forecasting

25. Nagaraja Gopalakrishnaswami
Machine Intelligence, Pattern Recognition

26. Depak B Phatak
Data Base Management Systems, Software Engineering, System Performance Evaluation, Distributed Client Server Information Systems.

27. Krithi Ramamritham
My research explores timeliness and consistency issues in computer systems, in particular, databases, real-time systems, and distributed applications. My current work addresses these issues in the context of Dynamic Data in sensor networks, embedded systems, mobile environments, smart physical 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 Ranade
Algorithms and Combinatorial Optimization

31. Krishna Shankaran Narayanan
Formal Methods, Bio-inspired Computing

32. Anirudha Sahoo
Wireless networks, QoS in Networks.

33. Amitabha Sanyal (Department Head)
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. Nandalal L Sarda
Databases, Information Systems, Software Engineering

36. Sharat Chandran
Computer Graphics, Image Processing, Vision. High Performance Computation.

37. Sivakumar G
Automated Reasoning, Logic Programming, Rewrite Systems, Networks, Distributed Systems

38. Milind A Sohoni
Combinatorial Optimization, Mathematical Programming, Algorithms

39. Sudarshan S
Query processing and optimization, Keyword querying on structured and semi-structured data, Testing database applications

40. Sundar Vishwanathan
Algorithms, Combinatorics, Complexity Theory.

Earth Sciences

Introduction

The Department of Earth Sciences (the erstwhile Geology Section of the Department of Civil Engineering) was constituted in 1982. Before that, it used to run the M.Sc. programme in Applied Geology, from 1964. Now, as a separate department, it offers academic programmes leading to M.Sc. (Applied Geology), M.Sc. (Applied Geophysics), M.Tech. (Geo-exploration), M.Tech. (Petroleum Geoscience), and doctoral degrees. The department has a total of 19 core faculty members, and the major research areas include natural history, hydrocarbon and mineral exploration, seismology, engineering geology and geothermal energy.

Academic Programmes

The M.Sc. curriculum emphasizes on basic science while the M.Tech. (Geoexploration) programme offers specializations in applied field mineral, groundwater, and petroleum explorations. M/s. Schlumberger Asia Services Ltd. have granted 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 also provide fellowships to two M.Tech. students of Petroleum Geoscience course and have granted funds for the development of a laboratory.

Student intake	
Ph.D.	: 17
M.Tech (Geoexploration)	: 13
M. Tech. (Petroleum Geoscience)	: 07
M.Sc. (Appl. Geology)	: 30
M.Sc. (Appl. Geophysics)	: 16
Degrees Awarded	
Ph.D	: 04
M.Tech	: 24
M.Sc. (Appl. Geology)	: 24
M.Sc (Appl. Geophysics)	: 11

R & D Activities

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 programme 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.

Sponsored Projects	
Ongoing Projects	: 34
New Projects	: 06
Completed Projects	: 01
Consultancy	
No. of Jobs	: 46

Sponsored research projects, both in pure and applied geology and geophysics, were carried out in the department. The research facilities in the department include Ar-Ar Geochronology Laboratory, XRD, ICP-AES, Cathodo-luminesence 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 high precision GPS and GIS facilities and a computer lab with Sun Workstation.

Details of New Sponsored Research Projects initiated in 2011-12

Name of the Project	Sponsoring Agency
Tectonothermal evolution of the Balaram-Abu Road Granulite terrane of the South Delhi Fold Belt, Rajasthan.	Department of Science & Technology
Glauconitisation in sequence stratigraphic framework by DST (satellite project)	Department of Science & Technology
Study of the motionally induced magneticfields from non-tidal global and regional oceanic currents and theirpossible signatures in land-based and space-borne magnetic observatories	IRCC Seed Grant
Establishment of a National Facility on Electron Probe Micro-Analyser (EPMA) at IIT, Bombay	Department of Science & Technology
Lithological Discrimination and Mineral Potential Mapping of Mamandur Polymetal Sulphide zone, Tamil Nadu : An Imaging Spectroscopy Perspective	Department of Science & Technology
Application of imaging spectroscopy and thermal remote sensing techniques indelineating palaeo-channel related Calcretes; an investigation in parts of Rajasthan and Gujarat for Carnotite exploration."	ISRO
Chemostratigraphic discrimination of fluvial Fatehgarh Formation from Sarnu and Lathi Formations, Barmer Basin, Rajasthan	Cairn Energy India (P) Ltd

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
11. High Precision Real Time Kinematic Global Navigation Satellite System
12. Fission Track Thermochronology Laboratory
13. Scintrex CG5-Autograv Gravimeter (Land)
14. Thermo 6500 Fourier Transform Infrared Spectrometer
15. Mineral Measurement setup
16. LINKAM "Heating stages- TMS 94", 1200dc and 1500dc- for Melt inclusion Geothermometry

Visitors to the Department

Dr. Felix Kaminsky, Director, KM Diamond Exploration Ltd., West Vancouver, British Columbia, Canada. He delivered two lectures during February 13–14, 2012 on: (1) "Mineralogy and Geochemistry of the Earth's Lower Mantle" and (2) "Nitrogen in Diamond".

Dr. Ulrich Mann, Senior Scientist at Forschungszentrum Juelich, Germany, has delivered a lecture on 16th Feb, 2012 on "POsidonia Shale – the Most Prolific Petroleum Source Rock of Western and Central Europe, a candidate for shale gas and shale oil".

Dr. Sridevi Jade and Dr. Anil Ernest of CMMACS, Bangalore, delivered a series of lectures on "GPS-Geodesy" from 25/03/2012 to 31/03/2012

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

Banerjee, S.
"Glauconite Formation in the Sequence Stratigraphic Framework of the Palaeogene of Kutch", *National level field based workshop on Geology of Kachh basin, western India: Present Satus and Future Perspectives*, held during January 26-29, 2012 at KSKV Kachchh University, Bhuj.

"Origin and Depositional Implications of Glauconite in the Eocene Harudi Formation and Oligocene Maniyara Fort Formation in Western Kutch", *National Seminar on Modern and Palaeo Sediments: Implications to Climate, Water resources and Environmental Changes & 28th Convention of Indian Association of Sedimentologists*, held during November 24-26, 2011 at Jawaharlal Nehru University, New Delhi.

Banerjee, S.
"Microbial Mat Originated Features in Palaeo-proterozoic Siliciclastics Resembling Ediacaran Fossils: Examples from the Vindhyan Supergroup, Central India", *28th International association of Sedimentologists Meeting*, held during July 5-8, 2011 at Zaragoza, Spain.

Masterton, S., D. Gubbins, D. Müller, K. H. Singh
"Magnetisation in the Oceanic Lithosphere and Prediction of its Magnetic Field Using Vector Spherical Harmonics", *IUGG XXV General Assembly*, June 28 - July 07, Melbourne, Australia,2011.

Biswal, T.K.
National Seminar on *Orissa's Mineral, Environment and Geosciences Assessment – 2011 (OMEGA–2011)* and *Golden Jubilee of Geological Survey of India*, Orissa.

Jadhav, G. N.
Workshop on *Processing of Iron Ore Fines and Slimes*, during January 23-25, 2012, held at TCS Innovation Labs: TRDDC, Hadapsar, Pune, Maharashtra; from (Organizers: TRDDC-Pune and IIME-Mumbai-Pune Chapter)

Jadhav, G. N.
International Seminar on Mineral Processing Technology, October 20-22, 2011, held at Udaipur, Rajasthan.

P. Jain, A. K. Naithani, T N Singh
"Application of tunnel Boring Machine for the construction of Maroshi-Ruparel College Tunnel, Mumbai", India, *Int. Conf. underground space technology (ICUST, 2011)*, SC-06-1-10.

Conferences/Symposia/Workshops/ Seminars (Coordinated/Chaired by Faculty)

Patel, S. C.
Chaired a session entitled "Diamond exploration" at the *10th International Kimberlite Conference,* February 6-11, 2012, Bengaluru, India.

Chandrasekharam, D.
Organized *International School on Geothermal Exploration* at Abdus Salam International Centre Theoretical Physics, Trieste, Italy between 7 – 11 November 2011

Sheth, H. C.
Served as the Scientific Advisory Committee, *4th International Maar Conference,* Auckland, New Zealand

Invited Lectures

Biswal.,T.K.,
"Understanding Civil Engineering in terms of Structural Geology and Earthquake" at Rizvi College of Engineering.

"Role of Geoscientist in oil field with basic introduction to Structural Geology and Geomechanics from Bore hole images" at Sinhgard College of Engineering.

Mathew, G.
"The Inter and Intracratonic Tectonics in India : Eastern Himalaya and Kachchh" at Freiberg, Germany.

Jadhav, G. N.,
"Economic Geology and Mineral Exploration" and "Groundwater Exploration'" at School of Earth Science, Solapur University, Solapur, Maharashtra.

Ramkrisnan, D.
"Reflectance and Emission Spectroscopy: Theory and practice" at Indian Institute of Remote Sensing **(IIRS)**, Dehradun 15th Feb.2012

"Spectroscopy and Spectrometry of Soils" at Indian Agriculture Research Institute **(IARI),** New Delhi, 9th August,2011 (2011)

"Fundamentals of Imaging Spectroscopy and Procedures in Hyperspectral Image Analysis for Snow-Ice studies" at Snow and Avalanche Study Establishment **(SASE),** DRDO, Chandigarh, *7th May,2011*

Patel, S. C.
"Topics in Metamorphic Petrology" at the Department of Earth Sciences, Sambalpur University, Burla, Odisha during February 20-21, 2012.

"Topics in Geochemistry and Metamorphic Petrology" at the Department of Geology, Institute of Science, Aurangabad, Maharashtra during March 30-31, 2012.

Singh, T. N.
"Landslide Simulation and Mitigation for Road Cut Slope in Mountainous Region", India, Academic Staff College, Mizoram University, 20th September, 2011.

"Numerical Simulation of Landslide Prone Area: Uses and Applications", *2nd Indian Landslide Congress,* Guwahati, 15th September, 2011.

"CO2 sink capacity in a decoaled mine area", Department of Applied Geology, H. S. Gaur University, Sagar, M.P., 22nd July, 2011.

"Multidimensional Challenges of Engineering Geology, The Geospectrum Interface and its Applications to Civil Engineering, Mumbai, 13th July, 2011.

"Revitalization of Mining Operation for Sustainable Development of India", Global Mining Discussion, Hotel-Hilton, Mumbai, 2011.

"Carbon Management and Utilizing Greenhouse Gases for Enhanced CBM Recovery", Academic Staff College inaugural lecture, Mizoram University, 19th September, 2011.

"Soft Computing for Mine Water Modeling – Some Issues", *Sustainable Development of Groundwater Resources in Industrial Regions,* ISM Dhanbad 23rd March 2012.

Significant Awards/Distinctions

Chandrasekharam, D.
Adjunct Professor in China University of Geosciences, Wuhan from 1.1.2012. ; Independent Director on the Boards of ONGC, Western Coalfields India Ltd., Indian Rare Earths Ltd and Mangalore Refineries and Petrochemicals Ltd.

Singh, T.N.
GSI Sesquicentennial Commemorative Award, 2011 ; Best paper award from Indian Society for Rock mechanics and Tunneling Technology (ISRMMT), 2011; Society of Geoscientists and Allied Technologists (SGAT) Award of Excellence-2011; Geosummit-2011 best paper award, Chennai,2011.

Technical Advisory Group member, North-Eastern Railway for development of new rail lines between Jaribam to Imphal. Govt. of India; National President and Executive Body Member of CAFET – INNOVA Technical Society, Hyderabad; and Member of PAC: For application of Geosciences and other relevant areas for weaker sections of society (AGSWSS), DST, New Delhi.

Technical Editor, The Indian Mining and Engineering Journal; Executive Editor, International journal of Earth Science and Engineering; Editorial Board Member, Journal of Indian Landslides; Editorial Board member, International journal of Global Technology Initiative; Editorial board member: Journal of Himalayan Geology, WIHG, Dehradun; Editorial Board member: International journal of Powder Metallurgy and Mining.

Honorary work

Biswal, T.K.
Reviewed the manuscripts for the following journals (International and National): Journal of Geological Society of India ; Precambrian Research ; Journal of Earth System Science.

Banerjee, S.
Served as member of Editorial board, Journal of the Geological Society of India.

P K Saraswati
Served as member of Editorial Boards of the following journals: Journal of Petroleum Geology (Blackwell, UK); Energy Exploration and Exploitation (Multi Science Pub., UK); Indian Journal of Geology (Kolkata); Journal of Palaeontological Society of India (Lucknow); Indian Journal of Geosciences (GSI, Kolkata); and Journal of the Geological Society of India (Bangalore).

Singh, H. K.
Reviewer for Physics of Earth and Planet. Interiors; served as member of American Geophysical Union.

Jadav, G. N.
Vice-President, Indian Institute of Mineral Engineers (IIME)-Mumbai-Pune Chapter; Executive Committee member, Indian Institute of Mineral Industry, (IIME), Jamshedpur, Jharkhand.

Served as Member of Editorial Board, Journal of Geological Society of India, Bangalore, Karnataka; Journal of Geological Society of India, Bangalore, Karnataka; National Steering Committee Member of XIth International Seminar on Mineral Processing; and Sap Committee member, UGC, Govt. of India, New Delhi.

Mathew, G.
Reviewed Papers for National and International Journals: Geological Society of India, Current Science; and Tectonophysics, International Journal of Remote Sensing.

Mohan, G.
Member of Panel of Editors for "Geohorizons."

Mukherjee, S.
Served as Associate Editor, International Journal of Earth Sciences and Associate Editor, Research Journal of Applied Sciences, Engineering and Technology Reviewer, for International Journal of the Physical Sciences; and Indian Journal of Science and Technology.

Mukul, M.
Served as Associate Editor, Journal of Earth System Science.

Pande, K.
Served as Member, DST Fast Track Proposal Committee and as CSIR Member, PAC Earth Atmosphere Ocean and Planetary Sciences.

Pandalai, H.S.
Served as Member, Editorial Board, Journal of Mathematical Geosciences; Member, Academic Council, Indian School of Mines, Dhanbad; and Member IGCP-540 on "Gold-bearing Hydrothermal fluids of Orogenic Deposits". Reviewed manuscripts for Journal of Earth System Science, Journal Geological Society of India, Journal of Asian Earth Sciences.

Patel, S.C.
Served as Member, National Working Group for IGCP-557 entitled "Diamonds, Xenoliths and Kimberlites" and as Member, Advisory Editorial Committee, Gondwana Geological Magazine, Nagpur.

Saraswati, P.K.
Served in the Editorial Boards of Journal of Petroleum Geology (Wiley); Journal Geological Society of India; Energy Exploration & Exploitation, (Multi-Science, UK); Journal Palaeontological Society of India; and Indian Journal of Geosciences (GSI). Served as Member, Board of Governors, RGIPT and as Member, Expert Committee (WOS-A), DST.

Sheth, H. C.
Reviewed manuscripts for the following international journals: *Journal of Volcanology and Geothermal Research, Journal of Asian Earth Sciences, Geology, G-Cubed.*

Singh, T. N.
Served as Member of Editorial Boards of Himalayan Geology, WIHG, 201;
International Journal of Geomaterial, Scientific Research Publishing, 2011;
The Indian Mining and Engineering Journal, Bhubaneswar, India; International Journal of Earth Science and Engineering; as Technical Editor, The Indian Mining and Engineering Journal, as Executive Editor, International journal of Earth Science and Engineering; and as Editorial Board Member, Journal of Indian Landslides; as Editorial Board member, International journal of Global Technology Initiative; Editorial board member: Journal of Himalayan Geology, WIHG, Dehradun; Editorial Board member: International journal of Powder Metallurgy and Mining.

Faculty Members and Their Specializations

1. **D. Chandrasekharam**
   Geochemistry, Igneous Petrology, Geothermics

2. **D. Ramakrishnan**
   Geomorphology and Remote Sensing

3. **E. Chandrasekhar**
   Geo-electromagnetism and Geophysics.

4. **George Mathew**
   Crystallography and Mineralogy

5. **G. Mohan**
   Seismology, General Geophysics

6. **Gajananrao Narayanrao Jadhav**
   Mineral Deposit Studies, Fluid-Melt Inclusions, Economic Geology

7. **H.K Singh**
   Seismology

8. **H.S. Pandalai**
   Ore Geology, Mining Geostatistics

9. **Hetu. C. Sheth**
   Igneous Petrology and Volcanology

10. **Kanchan Pande**
    Isotope Geology, Geochronology, Geochemistry

11. **Malay Mukul**
    Structural Geology, Neotectonics, GPS Geodesy

12. **Munukutla** Radhakrishna
    Gravity, Magnetic, Geodynamics

13. **Pratul K. Saraswati**
    Micropalaeontology, Stratigraphy, Petroleum Geology

14. **Santanu Banerjee**
    Sedimentology, Basin Analysis

15. **Soumyajit Mukherjee**
    Structural Geology

16. **Suresh C. Patel**
Metamorphic Petrology

17. **Suryendu Dutta**
Organic Geochemistry, Petroleum Geology

18. **Tapas Kumar Biswal**
Structural Geology and Precambrian Geology.

19. **Trilok Nath Singh**
Engineering Geology, Rock Mechanics

Emeritus Professor

20. **B.K. Sahu**
Sedimentology, Mathematical Geology, Mineral Deposit Modelling

Electrical Engineering

Introduction

The Department of Electrical Engineering has been one of the key departments of the institute since its inception. The department has expanded steadily over the last few decades and is now recognized as one of the leading academic and research centers in the world. The department is engaged in a wide spectrum of established and emerging electrical engineering disciplines. The current faculty strength is 61, and the department has more than 400 undergraduate and 600 postgraduate students. The recently joined faculty members are Dr. Virendra Singh, Dr. Anshuman Shukla, Dr. Pradeep Nair and Dr. Apurba Laha.

The five research groups in the department are: Communications and Signal Processing, Control and Computing, Power Electronics and Power Systems, Microelectronics, and Electronic Systems. The department has strong links with the academia and industry across the world. It also provides support to R&D organisations. The academic programmes of the department are rated very highly in the country. The graduating students are well placed in leading academic institutions, research organisations and industries. The department has a very active students' association (EESA) which organizes various social events, talks by guest speakers and senior students; maintains a well-equipped hobby room; and coordinates mentor programmes for junior students throughout the year.

A 48-core computer cluster has been installed in the High Power Computational (HPC) laboratory. The cluster is being used for research in parallel computing applications. The Nanoelectronics building that houses the Centre of Excellence in Nanoelectronics (CEN), National Centre for Photovoltaics & Education (NCPRE), and the Applied Material's Chemistry Laboratory for Energy and Nanoelectronics (CLEAN) was inaugurated by Dr. R. Chidambaram, Principal Scientific Adviser to Government of India, on March 2, 2012.

Academic Programmes

The department offers a comprehensive B.Tech. programme in Electrical Engineering and an intensive M.Tech. programme in each of the five specializations. The department was pioneer in initiating the five-year Dual Degree programme (B.Tech.+M.Tech. degrees) with specializations in Microelectronics and Communications. The Ph.D. programme offers exciting opportunities for research in emerging areas. Post-Doctoral Fellowships are also offered in select areas.

Students admitted during Academic year 2010-2011

Student Intake		
B.Tech.	:	593
Dual Degree	:	65
M.Tech.	:	136
Ph.D.	:	35

Degree Awarded		
B.Tech.	:	41
Dual Degree	:	41
M.Tech.	:	102
Ph.D.	:	23

The department has instituted scholarships for its students with outstanding academic performance, as follows:

- Prof. Revankar Memorial Scholarship
- Prof. Shankar Memorial Scholarship
- TCS Scholarship

There are also Ph.D. Students who are supported through industry-sponsored projects like IBM,

Infineon. A couple of departmental Ph.D. students have enrolled with IIT B Monash Research Academy, a joint venture between IIT Bombay and Monash University, Melbourne, Australia.

R & D Activities

The department is involved in a variety of frontier and traditional areas of research in Electrical Engineering. The thrust areas are: Communications Network & Internet, Signal and Speech Processing, Wireless & Mobile Communications, Optimal Control and Computing, Power System Analysis and Computation Power System Protection, Signal Processing application, Speech processing, VLSI System and Hardware Design, Devices and IC Technology, MEMS Design and Technology, Flash Memory Devices. The department received grants from various sources towards many new projects during the year, apart from various ongoing projects. The major funding agencies include DRDO, ISRO, DST, MHRD, MCIT and Applied Materials (USA).

Sponsored Research Projects

Sponsored Projects		
Ongoing Projects	:	89
New Projects	:	61
Completed Projects	:	18

Some of the sponsored research projects are as follows:

Sr. No.	Project Title	Agency Name	Status
1	Computing Environment for RCS Analysis of Flying Wing Configurations	Aeronautical Development Agency	New
2	Reliability of iL / High-k / Metal Gate Devices	Applied Materials Inc.,	New
3	Kerf-less Crystalline Si Solar Cells using HWCVD Epitaxy	Applied Materials Inc.,	New
4	Integrating Nanoscale Materials, Structures and Devices with Micorsystems	An Autonomous Research & Developement Centre of DST, Govt. of INDIA.	New
5	Microfabricated organic sensor platforms for environmental and security applications.	BOARD OF RESEARCH IN NUCLEAR SCIENCES	New
6	Computational Studies On Bladder Biophysics With Special Reference To Possible Mechanisms In Overactivity	DEPTT OF BIOTECHNOLOGY	New
7	Analog, Mixed-signal and RF IC Development and Test for biomedical applications	Department of Information Technology	New
8	Development of Pattern Recognition Algorithm for SAW based e- Date Nose Sensor.	Defence Research & Development Organisation	New
9	Device Engineering and Circuit Design for Organic Transistors fabricated using Hot-Wall Epitaxy2	Department of Science & Technology	New
10	Stability and Performance of Photovoltaic (STAPP)	Department of Science & Technology	New

Sr. No.	Project Title	Agency Name	Status
11	SERC Scheme "An Investigation into the Impact of Annealing on the Optical, Electrical and Spectral Scharacteristics of InAs/GaAs-Based Nano-Scale Quantum Dot Heterostuctures"	Department of Science & Technology	New
12	Germanium-based Device Development for sub-22nm node CMOS Logic Applications	Department of Science & Technology	New
13	Nanoscale Diode Selection Device Development for sub-20nm node High-Density Embedded Non-Volatile Memory	Department of Science & Technology	New
14	INT/Korea-Contactless Finger Motion Recognition for Mobile Applications	Department of Science & Technology	New
15	Improved efficiency c-Si Cells-Fabrication and characterization with industry collaboration	Department of Science & Technology	New
16	Assessment of Silicon Wire Array Radial Junction Solar Cells by Simulations and Experiments	Department of Science & Technology	New
17	Memory Modeling and Optimization in VLSI Subsystems	International Business Machines Corporation	New
18	Emerging strategies for Wireless Communication Networks	Indo-French Centre for the Promotion of Advanced Research	New
19	Topic of Robustmess of Asymmetric Devices in Advance CMOS	Intel Mobile Communications GmBh	New
20	RDF Share of Project Investigators & Co-PI's involved in NANO Phase -II (11DIT005)	Ircc - Dit OH	New
21	IITB STC - on Chip Ku/K band Quadrature Oscillator and PLL	Indian Space Research Organisation	New
22	FOSSEE: Free/Open Source Software in Science and Engineering Education (Assimilation of Open source Software in Science and Engineering)	Ministry of Human Resource Development	New
23	Remote-Triggered Laboratory on DSP	Ministry of Human Resource Development	New
24	Remote-triggered Virtual Laboratory on Electronic Devices and Circuits	Ministry of Human Resource Development	New

Sr. No.	Project Title	Agency Name	Status
25	Remote-Triggered Laboratory on Modern Digital Design	Ministry of Human Resource Development	New
26	UMG Silicon Solar Cells.	NORUT Narvik AS	New
27	High Performance Computing using GPU, FPGA & Multicore Processors	Naval Research Board	New
28	Process Design and Fabrication of RF MEMS devices	Research Centre Imarat	New
29	Modelling and Simulation of Germanium-based Devices	Synopsys Inc.	New
30	Computational Models for music discovery	University of Pompeu Fabra, Spain	New

Sr. No.	Project Title	Agency Name	Status
1	Development of an Ultracapacitor based Bi-Directional Power Electronic System	Aartech Solonics Ltd.	Ongoing
2	Development of an Ultracapacitor based Bi-Directional Power Electronic System	Aartech Solonics Ltd.	Ongoing
3	Development of an Ultracapacitor based Bi-Directional Power Electronic System	Aartech Solonics Ltd.	Ongoing
4	Germanium Transistor Pathfinding Project	Applied Materials Inc.,	Ongoing
5	The use of Wavelets and Filter Banks in 2D Gel Electrophoresis Images in Spot Picker Robot for Precise Protein Identification.	Board of Research in Nuclear Sciences	Ongoing
6	Design of a Wideband and Low Loss 250kW CW RF Coupler for RFQ cavity at 352.2 MHz	Board of Research in Nuclear Sciences	Ongoing
7	Nanoelectronics Centre	Department of Information Technology	Ongoing
8	Speech-based Access for Agricultural Commodity Prices in Six Indian Languages	Department of Information Technology	Ongoing
9	High Performance Cognitive Radio Networks by IIT Bombay & IIT Hyderabd	Department of Information Technology	Ongoing

Sr. No.	Project Title	Agency Name	Status
10	Development and Fabrication of GaN/AlGaN HEMTs	Defence Research & Development Organisation	Ongoing
11	Implementation of Correlation Attacks based on Turbo Codes	Defence Research & Development Organisation	Ongoing
12	Growth and Characterization of Self-assembled in As/GaAs Quantum Dot Infrared Photodetectors for High Temperture and Long Wavelength Operations	Department of Science & Technology	Ongoing
13	Silicon Nanocrystals as Luminescence Down Converters for Solar Cell Applications	Department of Science & Technology	Ongoing
14	Haptic Rendering of Digitally Preserved Indian Heritage.	Department of Science & Technology	Ongoing
15	Broadband Electromagnetic Energy Harvesting for Low-Power Applications: Theory and Development Including Design of CMOS AC to DC converter Chip	Department of Science & Technology	Ongoing
16	Spin-current High Speed Switching of Magnetization of Nano-magnets.	Department of Science & Technology	Ongoing
17	Emergency Communications System for Force 1 /Maharashtra Police based on 4G	Government of Maharashtra	Ongoing
18	Next Generation Scalable Wireless Infrastructure for Broadband in India	Intel Technology India Pvt. Ltd.	Ongoing
19	LDMOS Device Optimization	Maxim India Integrated Circuit Design Pvt. Ltd.	Ongoing
20	OSCAR for topics in Electrical Engineering: Stage 2	Internally funded by MHRD project	Ongoing
21	Electronics design using DSP, FPGA, CPLD and Micro controllers through simulation and direct access of the hardware	Ministry of Human Resource Development	Ongoing
22	National Centre for Photovoltaic Research and Education (NCPRE)	Ministry of New And Renewable Energy	Ongoing
23	PowerAnser Labs 2010 Onwards	TCE Consulting Engineers Ltd., Mumbai	Ongoing
24	Upgrading Facilities for MEMS, Design Activities at National Resource Centers	Aeronautical Development Agency	Ongoing

Sr. No.	Project Title	Agency Name	Status
25	Development of a Remote Whole Body radioactivity Detector (RWBRD) and a .. Procedures.	Bhabha Atomic Research Centre	Ongoing
26	"Fault detection and Diagnosis of Self Powered Neutron Detectors"	Board of Research in Nuclear Sciences	Ongoing
27	Design, Development and Analysis of High Power Switched Capacitor- Inductorless DC-Cc Converters"	Board of Research in Nuclear Sciences	Ongoing
28	Reliability Prediction of Electronic Systems in the Context of Ensuring Nuclear Safety	Board of Research in Nuclear Sciences	Ongoing
29	Real-Time Traffic Counting and Monitoring System	Department of Information Technology	Ongoing
30	Design and Development of a High Frequency, High Voltage Supply for High-field Asymmetric Waveform ion Mobility Spectrometry (FA-IMS) Application.	Defence Research & Development Organisation	Ongoing
31	Indo-Swiss (ISJRP) joint research project " Advanced Restoration and Super-resolution Techniques for 3D Fluorescence Microscopy"	Department of Science & Technology	Ongoing
32	India-UK Advance Technology Centre (IU-ATC) of Excellence in Next Generatio Networks Systems and Services.	Department of Science & Technology	Ongoing
33	DST/ Design & Development of Microfludic Biosensor 'A system on Chip' Platform for the Detection of Molecular Biomarkers for Myocardial Infarction'	Department of Science & Technology	Ongoing
34	Control and Optimization of Pulsed Laser Deposition Technique for Growth of ZnO Based Materials and Devices	Department of Science & Technology	Ongoing
35	Spin-Based Memory Device Using III-V and II-VI Semiconductors.	Department of Science & Technology	Ongoing
36	India-UK Advanced Technology Centre (IU-ATC) of Excellence in Next Generation Networks Systems and Services.	Department of Science & Technology	Ongoing
37	Indo-UK Advanced Technology Centre (IU-ATC) of Excellence in Next Generation Networks Systems and Services	Department of Science & Technology	Ongoing

Sr. No.	Project Title	Agency Name	Status
38	DST/ Silicon-compatible Spintronic Devices	Department of Science & Technology	Ongoing
39	DST/ Distributed Function Computation	Department of Science & Technology	Ongoing
40	Prof. V Ramgopal Rao / Tunnel FETs (Support of PhD. fellowship to one of his student.)	International Business Machines Corporation.	Ongoing
41	IIT(B) STC / Hybrid Control & Fault Detection during Re-entry of Reusable Launch Vehicles	Indian Space Research Organisation	Ongoing
42	IIT(B)STC / Compact Ku-Band On Chip VCO for Satellite Communication	Indian Space Research Organisation	Ongoing
43	OSCAR for Topics in Electrical Engineering	Internally funded by MHRD project	Ongoing
44	Assimilation of Open Source Software in Science and Engineering Education	Ministry of Human Resource Development	Ongoing
45	Development of Virtual Laboratory for Power Systems Analysis	Ministry of Human Resource Development	Ongoing
46	National Program for Technology Enhanced Learning (NPTEL II).	Ministry of Human Resource Development	Ongoing
47	Development of Virtual Laboratory for Synchronous Machine Connected to Grid	Ministry of Human Resource Development	Ongoing
48	Co-ordination of Virtual Laboratory Activities at IIT Bombay	Ministry of Human Resource Development	Ongoing
49	IMAGE Virtual Laboratory for VLSI Design	Ministry of Human Resource Development	Ongoing
50	Analysis of Transient Loading, Inverter Current Loading Propagation to Fuel Cells and Design of Bidirectional Active Power Network.	Naval Materials Research Laboratory	Ongoing
51	Development of Ferroelectric and Multiferroic MEMS Devices	Naval Research Board	Ongoing
52	Reliability of HiK/MG.	Renesas Technology Corporation.	Ongoing

Sr. No.	Project Title	Agency Name	Status
53	Metal Nano Crystals for Nanocrystal Flash Memory Technologies	Semiconductor Research Corporation	Ongoing
54	3D Simulation of Metal Nanodot Meory	Semiconductor Research Corporation	Ongoing
55	Indian Nano electronics Users Programmes (INUP)	Department of Information Technology	Ongoing
56	National Programme on Perception Engineering	Department of Information Technology	Ongoing
57	Advance research (ITPAR) Phase II Framework Telecommunication Joint Research Project "Advance Techniques for Remote Sensing Images Processing & Recognition	Department of Science & Technology	Ongoing
58	DST/ Optimization of Silicon Nitride for Application in Charge Trap Nanoelectronic Non - Volatile Memories by Direct Characterization of Bulk Traps	Department of Science & Technology	Ongoing
59	Geo ICT and Sensor Networkbased Decision Support System in Agriculture and Environment Assessment.	Department of Science & Technology	Ongoing
60	J C Bose Fellowship	Department of Science & Technology	Ongoing
61	A Detailed Investigation of the Electrical Properties of Nanoscale in As/GaAs Quantum dot-based.	Department of Science & Technology	Ongoing
62	Optimization of Asymmetric Device Design and Circuits in VLSI Technologies.	Infineon Technologies AG	Ongoing
63	Process and Device Simulation for New Device Structures & Architectures.	Infieon Technologies AG.	Ongoing
64	Design and Development of Course Material for Power Electronics related to Non-conventional Energy Conversion.	Ministry of New And Renewable Energy	Ongoing
65	"Design & Implementation of Particle Filter Algorithm for Underwater Mulitiple, Maneuvering Target Tracking"	Naval Research Board	Ongoing

Sr. No.	Project Title	Agency Name	Status
66	Development of Competence in Coupled Electromagnetic-Structural Analysis	Technology Information, Forcasting And Assessment Council	Ongoing
67	Rural Connectivity and applications,Wireless Communications and Networking	Tata Teleservices Ltd., Mumbai	Ongoing
68	Intel Corporation / Circuit Design involving Multi-gate Transistors.	INTEL	Ongoing
69	Intel Corporation/Multi-Gate MOSFETs	InternationalCollaboration Projects	Ongoing
70	Intelligent Power Grid Initiatives in India.	Sponsored by Private Organisations	Ongoing
71	Study of Wireless Sensor Networks - Event Sponsorship from M/s. Microsoft Research Lab. India.	Sponsored by Private Organisations	Ongoing
72	Corning Inc./Dispersed nanoparticulate systems for Consolidation of Porous, Dense Structures and Films.	Sponsored by Private Organisations	Ongoing
73	Dispersed Nanoparticulate Systems for Consolidation of Porous, Dense Structures and Films	InternationalCollaboration Projects	Ongoing
74	Special Manpower Development Programme for VLSI Design and Related Software (SMDP-II).	Department of Electronics, DIT	Ongoing

Consultancy Projects
No. of jobs : 25
No. of faculty involved : 17

Patents:
No. of patents granted : 3
No. of patents filed : 18

Patents Granted :

US patent US 8,097,930 B2, "Semiconductor Devices with Trench Isolations", **M. Shrivastava, H. Gossner, V. Ramgopal Rao, M. Shojaei Baghini**, Issue date: Januray 2012.

US patent US 8,089,314 B2, "Operational Amplifier Having Improved Slew Rate", **R. A. Thakker, M. Shrivastava, M. Shojaei Baghini, D. K. Sharma, Ramgopal V. Rao, M. B. Patil,** Issue date: Januray 2012.

S. Lodha, P. Ranade, C. Auth, "Method of Forming CMOS Transistors with dual metal silicide formed through the contact openings and structures formed thereby", US Patent 7,861,406, 2011.

Patents filed :

Gauri Joshi, B Srinadh, Prateek Kapadia and Abhay Karandikar, "A Relay ARQ Method to Minimize Packet Loss during Handover", Patent filed, September 2011 (India).

Suman Khakurel, Abhay Karandikar and Mahima Mehta, "A Method of Buffer Status Reporting for Relay Nodes in Cellular Networks", Patent filed, September 2011 (India).

Suman Khakurel, Abhay Karandikar and Mahima Mehta, "A Novel Scheme of Buffer Status Reporting in Relay Assisted Cellular Networks", Patent filed, September 2011 (India).

A System for extracting water from Air for Drinking and cleaning purposes and a method thereof (2011), **Jim John, Mehul Rawal, Chetan Singh Solanki, Anil Kottantharayil**, Indian patent filed, Application number 2408/MUM/2011.

G.Kumar, M. Shojaei Mahima Arrawatia, "A Fully Differential Electromagnetically Coupled Microstrip Antenna", under process.

BRNS Project, "Design of a wideband and low loss 250kW CW RF Coupler for RFQ cavity at 352.2 MHz", 2011-2013.

DST Project, "Broadband Electromagnetic Energy Harvesting for Low-Power Applications: Theory and development including Design of CMOS AC to DC converter Chip", 2010-2013.

"Successive Approximation Register Anaglog To Digital Converter", **M. Shojaei Baghini, V. G. Hande**, U.S. Patent Application No. 13/390,937, filed in February 2012.

"Self biased high efficiency fully differential RF Rectifier", **Mahima Arrawatia, Maryam Shojaei Baghini, Varish Didi, Girish Kumar**, Indian Patent Application No 470/MUM/2012, filed in February 2012.

"Process and Temperature Tracking Bias Circuit for Realization of PT-Invariant Circuits", Anvesha A 73/ MUM/2012, filed in January 2012.

"Differential Impedance to frequency converter", **Sanket Vinod Thakur, Gururaj Saileshwar, Kadayinti Naveen, Ayesha Mudassir, Priyanka Rajendra Kabara, Maryam Shojaei Baghini and Dinesh K. Sharma**, Indian Patent Application No. 2794/MUM/2011, filed in September 2011.

"AC current driven Open-bridge Configuration for measuring impedance variations of a Sensor", **N. A. Gilda, S. Nag, M. Shojaei, D. K.Sharma, and V. Ramgopal Rao**, Indian Patent Application No 2205/ MUM/2011, filed in August 2011.

"Frequency to Voltage Converter", **S. K. Gowdhaman, M. Shojaei Baghini, V. Anavangot, J. Mukherjee**, Indian patent application No. 1936/MUM/2011, filed in July 2011.

"Low power analog FM Transceiver for Bio-Telemetry Applications", **Maryam Shojaei Baghini, Santhosh Kumar Gowdhaman, Vineeth Anavangot, Jayanta Mukherjee**, Indian Patent Application 1473/MUM/ 2011, filed in May 2011.e of Issue: Jan. 3, 2012

Ronak Shah, Rishabh Iyer, S. Chaudhuri and S. Sarawagi, "Visual Storyboard Construction from Scripts and Subtitles", Indian Patent filed.

Indian Patent (Application No. 2409/MUM/2011 filed on 26th Aug. 2011) . Title: "An Optimum Emulator of the Dynamic Characteristics of a Wind Turbine".

Indian Patent (Application No. 1234/MUM/2012 filed on 16th April, 2012) Title: "Current Source Fed Input Capacitor-Less Single Power Stage Grid Connected PV System"

Extension Activities

The department conducted the following CEP courses during the year:
Technology Innovation Using TRIZ Methods, April 29-30, 2011; Grid Connected Solar PV Power Systems, May 6-7, 2011; Technology Innovation using TRIZ, July 22-23, 2011; Radiating Systems; Probability and Random theory; Computational Electromagnetics; Foundation of VLSI CAD; CMOS Analog VLSI Design; Compound Semiconductor Materials and Devices; Advanced Data Network; Electronic systems Design; and First course in optimization on July 21, 2011; Microwave integrated Circuits ; Sensors in Instrumentation; Statistical Signal Analysis; VLSI Technology; July 22, 2011; Finite field and its applications, July 22, 2011; Power Market leadership, August 8, 2011; Thin film solar PV Technologies, September 15, 2011; Common information Model for Power Systems, October 17,2011; TRIZ & Tayuchi Methods for Innovation and optimization, December 19, 2011; Problems solving and Opportunity Creation using TRIZ innovation, January 1, 2012; Solid state Microwave devices and application, January 2, 2012; Embedded System Design, January 2, 2012; Radio frequency microchip, January 2, 2012; Radar systems, January 2, 2012; Restructured Power System, January 2, 2012; Computer integrated and Manufacturing, January 3,2012; Application of PE to PS, January 3, 2012; Computer Vision, January 3, 2012

Visitors to the department

Dr. Venkat Anantharam, EECS, University of California, Berkeley. He delivered a lecture on "What Risks Lead to Ruin".

Prof. Ari Arapostathis, Uni. of Texas at Austin (Control). He delivered a talk on "Aspiration learning in Co-ordination Games."

Dr. Gita Pendharkar, Department of Electrical & Computer Systems Engineering, Monash University, Dr. Prashant Pawar, Tata Memorial Cancer Centre, Mumbai and Prof. Prabhat Ranjan, DAIICT, Gandhinagar. All three of them visited for the joint project meeting between IIT Bombay and Monash University.

Prof. Xavier Serra, Associate Professor of the Department of Information and Communication Technologies and Director of the Music Technology Group at the Universitat Pompeu Fabra in Barcelona, Spain. He delivered a talk on "CompMusic Computational Models for the Discovery of the World's Music."

Prof. Pinaki Mazumder, Department of Electrical Engineering and Computer Science, University of Michigan. He delivered a lecture on "Beyond Moore's Law Technologies & Architectures".

Prof. Karthik Shankar, University of Alberta, Canada. He delivered a talk on "Ordered Heterojunction Excitonic Solar Cells".

Prof. Helmut Sitter, Johannes Kepler University, Linz, Austria. He delivered a talk on "Color tuning in organic light emitting diodes."

Prof. Dvijotham Krishnamurthy, CSE Department, University of Washington. He delivered a talk on "Some Theoretical/Computational Aspects of linearly solvable optimal control."

Dr. Mukesh Khare, Senior Manager, Semiconductor Technology Research. He delivered a lecture on "IBM's Collaborative Research Model and 14nm Technology Challenges".

Dr. Subramanian S. Iyer, Chief Technologist & IBM Fellow,Microelectronics Division, IBM Systems & Technology Group. He delivered a lecture on "Deep Trenches to Skyscrapers: the evolution of embedded memory at IBM."

Prof. Mark Lundstrom, School of Electrical and Computer Engineering, Network for Computational Nanotechnology, Purdue University, West Lafayette. He delivered a lecture on "Understanding the Nanoscale MOSFET".

Prof. Habil Jörg Schulze, Institute of Semiconductor Engineering (IHT), University of Stuttgart, Germany. He delivered a lecture on "Group IV-based Hetero-Epitaxy for Nanoelectronic Applications."

Dr. Satish Ogale, Chief Scientist and Coordinator, Center of Excellence in Solar Energy, NCL, Pune. He delivered a lecture on "Engineered Nanomaterials and Morphologies for dye sensitized solar cells and other optoelectronic applications".

Prof. Yezekael Hayel, University of Avignon, France. He delivered a lecture on "Optimal Sensing Strategy for Opportunistic Secondary Users in a Cognitive Radio Network".

Prof A.M.Gole, University of Manitoba. He delivered a lecture on "New Converter Topologies for High Voltage Dc Transmission".

Dr. Benjamin Lee, NREL, USA. He delivered a lecture on "Light Management for Epitaxial, Crystalline Thin Film Silicon Solar Cells".

Dr. Vivek Krishnamurthy, Data Storage Institute, Singapore delivered a lecture on "Silicon Photonics for all Optical Processing"

Dr. Venkat Anantharam ,EECS, University of California, Berkeley. He delivered a lecture on "What Risks Lead to Ruin".

Prof. Sanjoy Mitter, LIDS, Electrical Engineering and Computer Science, MIT Cambridge, MA. He delivered a lecture on "Probabilistic Models in Neuroscience."

Prof. A. M. Gole, University of Manitoba. He delivered a lecture on "New Converter Topologies of High Voltage DC Transmission."

Conferences/Symposia/Workshops/ Seminars (Participated/papers presented)

Agwarwal Vivek

"Modeling & Simulation of Radiated & Conducted EMI/EMC issues due to presence of Switched mode Power Supplies in Military Systems," *COMCAS 2011*(Israel), November 2011.

"Performance of Miniature Fuel Cells with Segmented Contacts," *2nd International Conference on Electric Power and Energy Conversion Systems*, the American University of Sharjah, UAE, November 15-17, 2011.

"Design and Implementation of Communication and Control Architecture for Solar PV based Microgrid supported by PEM Fuel Cell based Auxiliary Source," *37th Photovoltaic Specialists Conference*, USA, 19-24 June, 2011.

"A Low Cost Light Weight and Accurate Photovoltaic Emulator," *37th Photovoltaic Specialists Conference,* held in Seattle, USA, 19-24 June, 2011.

"Advance Control Scheme and Operating Modes for Large Capacity Centralized PV-Grid Systems to Overcome Penetration Issues," *37th Photovoltaic Specialists Conference*, Seattle, USA, 19-24 June, 2011.

"Novel Control Scheme for High Power Centralized PV-Grid System to Realize Functionalities of AVR and Governor as in Conventional Generators," *37th Photovoltaic Specialists Conference*, USA, 19-24 June, 2011.

"A Compact Switched Capacitor DC-DC Converter Based Global Peak Power Point Tracker for Partially Shaded PV Arrays of Portable Equipment," *37th Photovoltaic Specialists Conference,* USA, 19-24 June, 2011.

Borkar V. S.
School and Workshop on Network Science at Electrical Engineering and Computer Science, IISc, Bangalore.

Participated in the *16th INFORMS Applied Probability Conference* during July 6-8, 2011 Stock-holm, July 6-8, 2011. (Also organized a special session on '*Learning in stochastic systems*')

SIMPLEX 2012, Fourth Annual Workshop on Simplifying Complex Networks for Practitioners on April 17, 2012 at Lyon, France.

Duttagupta S. P
"Reconfiguration Strategy for Optimization of Solar Photovoltaics Array under Non-Uniform Illumination Conditions," *37th IEEE Photovoltaic Specialists Conference*, Seattle, June 19-24, 2011.

"Performance of Miniature Fuel Cells with Segmented Contacts attached to the Gas Diffusion Layer, effect of Segmented Contacts on Fuel Cell Performance using 3-D Modeling," *International Conference on Energy and Electrical Systems*, ASME Press, Kuala Lumpur, Malaysia 2011.

Girish Kumar
Participated in the *workshop on Cell phones Towers Radiations Hazards and Solutions* held on November 20, 2011 at IIT Mumbai.

IEEE IAW & AEMC 2011 held on December 18-19, 2011 at Kolkatta.

National Seminar on Cell tower radiation hazard held on January 7, 2012 at Goa.

ATMS held on February 2, 2012 at Mumbai.

International Conference on Engineering Education held on February 3-4, 2012 at the New Century, Kolkata *Ensuring Public Health and Safety in the Mobile Industry* held on February 7-8, 2012 at Delhi.

Round Table Conference of EMF Radiation at Delhi on March 27, 2012.

"Non-radiating edge gap coupled Capsule-shaped and Nose-shaped Microstrip Antennas for 3G Applications," *ICECT, Kanyakumari*, India, April 2012.

Gupta Shalabh
"Analog Processing Based Equalizer for 40 Gbps Coherent Optical Links in 90nm CMOS*," 25th International Conference on VLSI Design*, Hyderabad, India, January 2012.

"Buffer Design and Eye-Diagram Based Characterization of a 20 GS/s CMOS DAC," *25th International Conference on VLSI Design*, Hyderabad, India, January 2012.

Karandikar Abhay
"Interference Modeling for Cognitive Radio," *16th International OFDM-Workshop,* 2011.

Manjunath D.
"Network Flows for Functions," *IEEE International Symposium on Information Theory* (ISIT-2011), St.~Petersburg, Russia, Aug 2011.

Mukherjee Jayanta
"Optimization of Analog RF Circuit Parameters using Randomness in Particle Swarm Optimization", *WICT 2011*, Mumbai.

"Damping the Cavity-Mode Anti-Resonances' Peaks on a Power Plane by Swarm Intelligence Algorithms," *ISCAS 2012*.

"Maintaining Power Integrity by Damping the Cavity-Mode Resonances Peaks on a Power Plane by Particle Swarm Optimization," *ISQED 2012*, Santa Clara

"Low Cost, Efficient, High Gain and Wideband Microstrip Antenna Fed Yagi Array in Fabry-Perot Cavity," Sanjeev K Mishra et.al., *PIERS 2012*, Kuala Lumpur.

"Optimizing Gain of 5 GHz RF Amplifier keeping Minimum Deviation in Center Frequency and Noise Figure," J.N Tripathi, P R Apte, J Mukherjee, *ISIC 2011*, Singapore, Dec 2011.

"Parallel Metal Plated U-Shape Ultra-wide Band Antenna with WLAN Band-Notched Characteristics," *PIERS 2012*, Kuala Lumpur.

"Effect of Superstrate Height on Gain of MSA Fed Fabry Perot Cavity Antenna," *Loughborough Antennas & Propagation Conference 2011*.

"Optimizing Phase Noise of 2 GHz RF Oscillator with Minimum Frequency Deviation," *IEEE MWSCAS 2011*, Seoul, Korea.

Saha Dipankar

"Dry Etching of GaCrN using Inductively Coupled Cl2 /Ar Chemistry" *XVI International Workshop on the Physics of Semiconductor Devices*, *IWPSD 2011*, Indian Institute of Technology Kanpur, Kanpur, India; December 19-22, 2011.

"A homogeneous ferromagnetic semiconductor above Room-temperature: Cr-doped GaN" *XVI International Workshop on the Physics of Semiconductor Devices*, IWPSD 2011, Indian Institute of Technology Kanpur, Kanpur, India; December 19-22 , 2011.

"Electrical Characterization of Co/n-GaN Schottky Diodes," *XVI International Workshop on the Physics of Semiconductor Devices, IWPSD 2011*, Indian Institute of Technology Kanpur, December 19-22 , 2011.

"Cl2/Ar Based Dry Etching of GaCrN using Inductively Coupled Plasma", *2012 AMEE Workshop on Nanoelectronics and Optoelectronics (IWNO 2012)*, Hong Kong, Jan. 18-19, 2012.

"Room-temperature Ferromagnetism in Homogeneous Cr-doped GaN", *56th Annual MMM Conference,* Scottsdale, Arizona, USA October 30 - November 3, 2011.

"Effect of Drift on Spin Polarization in a Spin-LED," *56th Annual MMM Conference,* Scottsdale, Arizona, USA October 30 - November 3, 2011.

"Temperature Dependent Characteristics of Fe/n-GaNSchottky Diodes," *2011 International Conference on Solid State Devices and Materials (SSDM 2011),* Nagoya, Japan, September 28-30, 2011.

Singh Virendra

"Evaluating Impact of soft errors in embedded system," *IEEE International Workshop on Reliability Aware System Design and Test (RASDAT) 2012*, Hyderabad, India, Jan 2012.

"Low power scan flip-flop Design to eliminate output gating overhead for critical paths", *IEEE International Workshop on Reliability Aware System Design and Test (RASDAT) 2012*, Hyderabad, India, Jan 2012.

"A highly robust and cost effective SEU tolerant memory cell," *IEEE International Workshop on Reliability Aware System Design and Test (RASDAT) 2012*, Hyderabad, India, Jan 2012.

Chandorkar Mukul

National Power Electronics Conference (NPEC) held during December 19-22, 2011 at Shibpur,West Bengal.

IEEE Electric Machines and Drives Conference, IEMDC on May 15-18, 2011at Canada.
Aegean Conference on Electric Machines and Power Electronics (ACEMP) on September 8-10, 2011 at Istanbul, Turkey.

"GPS Synchronized Real Time Playback System for De-centralized Controller Testing," *National Power Electronics Conference (NPEC)*, 19-22 December 2011, Shibpur, West Bengal.

"Real Time Circuit Simulation Environment on a Multi-core Digital Signal Processor," *National Power Electronics Conference (NPEC),* 19-22 December 2011, Shibpur, West Bengal.

"Effect of Machine Asymmetry on a Two-machine Direct Torque Controlled Induction Motor Drive," *European Power Electronics Conference (EPE) - ECCE Europe*,August 30-01 September 2011, Birmingham, UK.

"Design and Analysis of PLLs for Line-connected Converters in Three Phase Systems," *Aegean Conference on Electric Machines and Power Electronics (ACEMP)*, September 8-10, 2011, Istanbul, Turkey.

Chakraborty Debraj

"Comparison of Various Linear Discriminant Analysis Techniques for Fault Diagnosis of Re-Usable Launch Vehicle," *50th IEEE CDC-ECC,* December 12-15, 2011.

"Partial Pole Placement and Controller Norm Optimization over Polynomial Stability Region," *Proceedings of the 18th IFAC World Congress,* Milan, Italy, 28 Aug-2 Sep, 2011.

Dey Bikash Kumar

"On the Sum Capacity of Multiaccess Block-Fading Channels with Individual Side Information," *ITW 2011*, Paraty, Brazil.

"Efficient Flow Allocation Algorithms for In-Network Function Computation," Globecom 2011.

"Network Flows for Functions," *ISIT 2011*.

IEEE International Symposium on Information Theory, St. Petersburg on July 31 - August 6, 2011 at Russia.

Lodha S.
"ZnO: an attractive option for n-type Metal-interfacial Layer-semiconductor (Si, Ge, SiC) Contacts," *VLSI Symposium on Technology*, Hawaii, 2012.

"4F2 Two-Terminal Selector for Bipolar RRAM: High on-current density and Random Dopant Fluctuation Effect," *Device Research Conference,* Pittsburgh, 2012.

"Epitaxialy Defined (ED) FinFET: to Reduce VT Variability and Enable Multiple VT", *Device Research Conference*, Pittsburgh, 2012.

"Contact Resistance Reduction on Germanium through Metal Work Function Engineering," *MRS Spring Meeting,* San Francisco, 2012.

"Ohmic Contacts to N-type Germanium using a Thin ZnO Interfacial Layer," MRS Spring Meeting, San Francisco, 2012.

"Novel Nanocrystal-based Contacts on n and p-type Germanium," *39th Conference on the Physics and Chemistry of Surfaces and Interfaces (PCSI)*, Santa Fe, USA, January 2012.

Patkar Sachin
"A Compact Gaussian Random Number Generator for Small Word Lengths," *Applied Reconfigurable Computing - 2011* (ARC-2011), Belfast, Ireland, 23-25 March 2011

Pillai Sibi Raj
"On the Capacity of Multiplicative Multiple Access Channels with AWGN," *IEEE Information Theory Workshop 2011,* Paraty, Brazil

"On the Capacity of Multiaccess Block Fading Channels with Individual State Information," *IEEE Information Theory Workshop 2011*, Paraty, Brazil

Rajbabu
International Conference on Image Processing (ICIP) on September 2011 at Brussels, Belgium.

Rao Ramgopal
5th China Medical Biotech Forum, November 7-9, 2011 in Beijing, China.

8th International Workshop on Nanomechanical Sensing, May 11-13, 2011, Dublin, Ireland (Invited Talk)

219th Electrochemical Society (ECS) meeting, May 1-6, 2011, Montreal, Canada

Shojaei Maryam
INUP workshops, October 2011 and December 2011, IIT-Bombay.

National Seminar at St. Francis College, Mumbai, February 2011.

Mahapatra Souvik
MIRAI Variability Conference, Tokyo, Japan, 2011.

International Conference on Materials for Advanced Technologies (ICMAT), Singapore, 2011.

International Conference on the Physical and Failure Analysis of Integrated Circuits (IPFA), Seuol, Korea, 2011.

International Conference on the Physical and Failure Analysis of Integrated Circuits (IPFA), Seuol, Korea, 2011.

Solid State Devices & Materials (SSDM) Conference, Nagoya, Japan, 2011.

Conferences / Symposia / Workshops/ Seminars (Co-ordinated and chaired by faculty)

Borkar V. S.
Chaired the *Organizing Committee of Scientific Discovery through Intensive Data Exploration* at Bangalore.

Chaired the Technical Program Committee*, Fifth International Conference on Performance Evaluation Methodologies and Tools* on May 16-20, 2011 at France.

Mahapatra Souvik
Chaired the *transistor reliability committee, International Reliability Physics Symposium, Anaheim,* at USA.

Rao Ramgopal
Coordinated the *4th INUP Hands on Training* held during April 25-29, 2011 at IIT Bombay.

Coordinated the *6th INUP Hands on Training* held during October 10-14, 2011 at IIT Bombay.

Coordinated the *6th INUP Familiarization Workshop* held during November 30 - December 4, 2011 at IIT Bombay.

Coordinated the *8th INUP Hands on Training* held during April 9-13, 2012 at IIT Bombay.

Coordinated the *9th INUP Hands on Training* held during April 23-27, 2012 at IIT Bombay.

Shojaei Maryam
Coordinated the *SMDP workshop* in December 2011 by Prof. Ram Achar from Carleton University, Canada, December 2011 at EE Department, IIT Bombay.

Vasi Juzer
Coordinated the *Frontiers of Excellence in Photovoltaic Science and Technology* during January 15–17, 2012 at IIT Bombay.

Invited Lectures

Borkar V. S.
"Risk constrained Markov decion processes" at TIFR, Mumbai on February 16-27, 2012.

B. Dynamic Models of Coordination" at IIT Bombay on February 21, 2012.

"Advances in Nano Science – Energy, Water and Healthcare," College of Material Sci. & Eng. (CMSE), Donghua University, Shanghai, China, November 9-11, 2011.

"Stochastic Approximation with Bad Noise", *Information The- ory and Applications Workshop (ITA)*, February 6, 2011.

"Opinion Formation under Peer Pressure", I*nterdisciplinary Workshop on Information and Decision in Social Net-works, MIT*, USA, May 31, 2011.

"Virtual Institutes for Computational and Data-enabled Science and Engineering", Bangalore, December 21-22, 2011.

"Ergodic Control: theory and algorithms", *TWAS Annual Meeting*, Trieste, Italy, November 20-23, 2011.

Chakrabarti Subhananda
"Quaternary Capped Nanoscale In(Ga)As/GaAs Quantum Dot based Devices for High Temperature Infrared Detection," *International Workshop on Physics of Semiconductor Devices (IWPSD) 2011*, JMI, New Delhi, December 2011.

"Quaternary Capped Nanoscale In(Ga)As/GaAs Quantum Dot based Devices for High Temperature Infrared Detection," *International Conference on Trends in Optics and Photonics (ICONTOP 11),* University of Calcutta, December 7-9, 2011

"Quaternary Capped Nanoscale In(Ga)As/GaAs Quantum Dot based Devices for High Temperature Infrared Detection," *Indian Vacuum Society symposium on thin films: science and technology (TFST) 2011*, BARC, Mumbai, November 9-12, 2011.
"Multicolor Infrared Detection using Quaternary Capped In(Ga)As/GaAs Quantum Dot Infrared Photodetectors and arrays", University of California Los Angeles, USA, April 13, 2012.

Chandorkar Mukul
"Synchronised Phasor and Frequency Measurements," *National Power Electronics Conference*, Shibpur, West Bengal, 19 December 2011.
"Power Electronics and Power Systems Activities at IIT Bombay", ABB Corporate Research, Raleigh, USA on May 26, 2011.

"Power Electronics and Power Systems Activities at IIT Bombay", GE Corporate Research, Schenectady, USA on March 3, 2012.

"Medium Voltage Industrial Induction Motor Drives", Cree Semiconductor Inc., Durham, USA on March 23, 2012.

Girish Kumar
"Cell Phone/Tower Radiations Hazards and Solutions," at International Conference on Engineering Education in the New Century; at ASSOCHAN, Delhi, National Seminar, Indore, April 9, 2011, and many other places.

Karandikar Abhay
"Driving Innovation for Telecom in India: Role of IPR," *Innovate India 2012*, Mumbai, March 23, 2012.

"Driving Research Agenda for Telecom in India: Role of IPR," Plenary Session Talk, Regional International Telecommunications Society (ITS) Conference 2012, Delhi, February 23, 2012.

"Wireless Broadband Infrastructure in India," *India Research Network Meeting*, Samsung, Bangalore, November 4th 2011.

"Towards 4G+," *2nd Bholanath Saikia Memorial Lecture*, NIST Mirza, Guwahati, Assam, October 23, 2011.

"Trends in Wireless Networks," Invited Talk, FlyTxt, July 8, 2011.

"Next Generation Wireless Networks: Research Challenges," *ASET Colloquium,* TIFR, June 10, 2011.

Khaparde S A
"Development and Dynamics of Power Exchanges in India," in *Conference on Competitive Electricity Markets and Regulatory Frame work- Issues and Challenges* at Central Power Research Institute (CPRI), Bangalore held in February 2012.

"ICT Empowered Grid - India's future power" at the Norwegian University of Science and Technology (NTNU) from October 1 to 9, 2011 in Trondheim.

Nair Pradeep
"Modeling issues in Nanotechnology," NIT Nagpur, January 2012.

Rao Ramgopal
"IEEE Engineering in Medicine & Biology Society (EMBS):Point-of-Care Technologies," Bangalore, Jan 16-18, 2013.

IEEE Electron Device Society (EDS) Distinguished Lecture, organized and Sponsored by the IEEE EDS Society and IEEE EDS Bhuwaneshwar Chapter, April 07, 2012.

"Nanocomputing and Biochips," ISI Kolkata, March 26-28, 2012.

"15th VLSI Design And Test Symposium," July 7-9, 2011, at Pune, India.

"Nanometer Scale CMOS Technology" (IEEE EDS-WIMNACT), organized and sponsored by the IEEE EDS Society and IEEE AP/ED Mumbai Chapter & COE, Pune, April 19, 2011.

"Electronics & Information Technology Exposition: E-Governance - Public Services Closer Home (ELITEX 2011)", organized by the Department of Information Technology. Ministry of Communications & Information Technology (MCIT), Govt. of India, April 4-5, 2011.

Saha Dipankar
"GaN High Electron Mobility Transistors," *XVI International Workshop on the Physics of Semiconductor Devices,* Kanpur, December 2011.

Sule Virendra
"Algebraic Cryptanalysis: AES and Boolean equations," BARC Bombay, August 5, 2011.

"Boolean Equations and Slgebraic Cryptanalysis," DRDO sponsored W*orkshop on Algebrai Cryptanalysis,* C.R.Rao Advanced Institute for Mathematics, Statistics and Computer Science, Hyderabad, November 23, 2011.

"Discrete Log Problem, Algebraic cryptanalysis and relationships to block cipher design", *Workshop on Block Ciphers,* BARC, Mumbai, December 17, 2011.

Mahapatra Souvik
IEEE DL lectures in the following IEEE-EDS Chapters: Santa Clara, New York, Singapore, Delhi, Bangalore

Awards & Distinctions

Chaudhari Subhasis
"NASI-Reliance Industries Platinum Jubilee Award for Application Oriented Innovation, 2011"

Karandikar Abhay
"Award for Excellence in Teaching", IIT Bombay, 2011

Shevgaonkar R.
"IEEE UG Teaching Award 2011"

Duttagupta S. P.
Distinction: B. Patnaik (PhD scholar) selected for General Electric (John F Welch Technology Center, Bangalore, India) Top 40 Women Research Scholars in India for Women in Technology and Science (WITS) Forum, November 2011.

Kottantharayil Anil
"Best poster award" at the IIIrd International Conference on Advances in Energy Research (ICAER 2011), IIT Bombay, for the poster: "Pulsed DC Reactive Sputter Deposited Aluminum Oxide for Surface Passivation of P-type Silicon for Solar Cell Applications" by Meenakshi Bhaisare, Gaudhaman Jeevanandam and Anil Kottantharayil

Mukherjee Jayanta
The technology, "Low Power Bio Medical Transmitter" was one among top 50 selected technologies for the "DST - Lockheed Martin India Innovation Growth Programme 2012"

Rao Ramgopal
"Best Research Paper Award", Global Interposer Technology (GIT) Workshop: Design, Technologies, Applications, Markets and Manufacturing Infrastructure, November 14-15, 2011, Georgia Institute of Technology, Atlanta Georgia USA (decided by an eminent jury of industry professionals.

Saha Dipankar
Associate of Indian Academy of Sciences 2010-2013.

Shojaei Maryam
Co-recipient of the "Best paper award", IEEE ISVLSI Symposium, India (2011).

Project Guide and Co-recipient of the "first place award" all over India in Cadence Design Contest-India (2011).

Honorary Work

Borkar V. S.
Served as Member of: (i) Executive committee of International Society for Dynamic Games, also of Isaacs Award Committee of ISDG. (ii) Sectional Committee for Mathematics, INSA. (iii) Engineering Sciences Research Committee, CSIR

Editorial board member of: Dynamic Games and Applications (Springer); Mathematical Control and Related Fields (American Inst. Of Mathematical Sciences); Applicationes Mathematicae (Polish Academy of Sciences); Tracts and Research in Mathematics (book series), Hindustan Publ. Agency, New Delhi; Sadhana: Proc. Indian Academy of Sciences on Engg. Sciences; Reviewer for SIAM; and Control and Optim., IEEE Trans. on Automatic Control, IEEE Trans. on Systems, Man and Cybernetics, Automatica, Systems and Control Letters, J. Appl. Prob., Adv.Appl. Prob., Annals of Appl. Prob., IEEE Conf. on Decision and Control, and others

Karandikar Abhay
Served as Member of 5-members committee (chaired by Justice SH Patil) to draft National Spectrum Management Act (to replace Indian Wireless Telegraph Act 1933); Member of Working Group of Planning Commission on Telecommunications for 12th Plan of India; Co-Chair of drafting group on new technology for National Frequency Allocation Plan 2011; Key Member of the committee set up by government to consider TRAI recommendations for measures to improve telecom infrastructure in rural India; and Member of Board of Advisors of Reliance InfoTel 2011; Fellow of IETE

Rao Ramgopal
National Level Advisory Committees

Served as Chairman, Innovation Council on Nanoelectronics, Department of Information Technology, Ministry of Communications & Information Technology, Govt. of India (since 2011); Member, "Nano Applications and Technology Advisory Group (NATAG), Nano Mission, Department of Science & Technology (DST), Govt. of India (2008-2012); and Member, Governing Council, International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI) Hyderabad (since 2012).

Shojaei Maryam
Served as Active member of *SMDP II*, supported by DIT, Government of India, 2011; TPC Member, Emerging Applications and Technologies sub-committee, IEEE A-SSCC *(Sister Conference of* IEEE ISSCC*)*, 2011, South Korea; TPC Member, Low-Power Design/Circuits and Technology Track, *IEEE International Conf. on VLSI Design* (Sister Conference of *IEEE DAC*), 2012, India; TPC Member, Circuit and System Design, IEDEC and ISQED Conferences), 2011, USA; TPC Member, ASQED Conference 2011, Malaysia; TPC Member, ISVLSI Conference 2011, India; TPC Member, Nanoelectronics Track, IEEE ICM Conference 2011, Tunisia; Member of Synopsys Curricula Advisory Board 2011; and Track Chair (Analog and Mixed-Signal System Design) and TPC Member, ISED 2011, India.

Faculty Members and their Specialisations

1. **Arjun Arunachalam**
   Magnetic Resonance Imaging: Image reconstruction, Parallel Imaging,Compressed sensing, Rf antenna design

2. **Arun N.Chandorkar**
   Analog and Mixed signal VLSI Design, Ultra-Thin Gate insulators for VLSI technologies, High-K Dielectrics for VLSI Technologies (Nano Electronics), RF VLSI Design, Radiation Hard MOS Technologies, Communication/DSP based System and chip Design, Semiconductor Device modelling and Reliability Simulation Tools, Memory Testing, Analog and Mixed signal Test and Fault simulation, Device Testing and Reliability, Modelling, High Power semiconductor Devices, Power Electronic Systems, Optically Switched Microwave components, Sensors, Microelectronics System Packaging.

3. **Anil Kottantharayil**
   CMOS device physics,charaterization, modelling and technology

4. **Abhay Karandikar**
   Communication Network, Quality of Service Guarantees in Internet, telecommunication switching, Digital communication

5. **A.M. Kulkarni**
   Power System Dynamics, Flexible AC Transmission Systems, HVDC Transmission Systems

6. **Apurba Laha**
Microelectronics, MBE growth, Oxide electronics, Si and Ge

7. **Animesh Kumar**
Applied statistics, integrated circuits, signal processing sampling theory.

8. **Anshuman Shukla**
Multilevel converters, Modulation and control power electronic converters, Power electronics applications in power systems (FACTS, HVDC, custom power devices, etc.), Renewable energies, Energy storage, Control of electric drives, Hybrid and solid-state circuit breakers and current limiters.

9. **Ashwin Tulapurkar**
Physics and applications of spintronics devices, spin-injection, spin-current induced magnetization switching. High speed measurements of switching. Noise in nano-devices. Ferromagnetic resonance.

10. **Ajit Kumar Verma**
Reliability in Engineering Design, Software Reliability, Design and Analysis of Fault Tolerant Systems, Physics of Failures, PSA, RBI and Power System Reliability.

11. **B. M. Arora**
Optoelectronic materials and devices III-IV compound semiconductors solar cells.

12. **Bikash Kumar Dey**
Error correcting codes, wireless communication, signal processing

13. **B.G. Fernandes**
Power electronic interface for non-conventional energy sources, Electrical machine design and control.

14. **Debraj Chakraborty**
Optimal Control, Differential Games, Nonlinear Theory, Control of Biological Systems and Diseases.

15. **D. Manjunath**
Computer and Communication Network Protocols, Systems and Algorithms Performance Modeling Queueing Theory and Simulation, Stochastic Systems.

16. **Dipankar Saha**
Microelectronics, New Device Physics, Semiconductor Spintronics, Spin injection, transport and detection in III-V systems, Device Reliability.

17. **D. K. Sharma**
MOS device modeling, VLSI design and technology. Microelectronics-technology and Device characterisation; and mixed signal design.

18. **Girish Kumar**
Microstrip antennas and arrays, Broadband antennas Microwave integrated circuits; EMI/ EMC; RF Circuits.

19. **Girish P. Saraph**
RF Electronics & Wireless Commmunications, High Power Microwave Sources and Radars, Communication Networks, Fiber Optics & Optical Networks

20. **H. Narayanan**
Building large scale circuit simulators, Combinatorial optimization including submodular function theory Large scale system partitioning.

21. **Harish K. Pillai**
Control theory; Behavioural theory of Systems Multidimensional systems; optimal control; Coding theory; Optimization techniques.

22. **Jayanta Mukherjee**
RF VLSI Design, Testing, Noise Modeling, Analog VLSI

23. **Juzer Vasi**
Physics and technology of CMOS devices, nanoelectronics.

24. **Joseph John**
Electronic Circuits, Optical Fiber Communications Electronic Systems and instrumentation.

25. **Kishore Chatterjee**
Utility friendly converter topologies, Power Factor Correction techniques, STATCOM, Switched Mode Rectifiers, Electronic Ballast, Control of Electric Drives

26. **Maryam Shojaei Baghini**
Technology-aware design, integrated circuit and system design with emerging devices, Integrated power management for SOC applications, Analog/ Mixed-signal. IC design for different applications, Circuit and system modeling, Circuit design optimization, Analog/Mixed-signal/RF EDA (CAD tools, theory and mplementation), Circuit and system design with organic thin film components, RF/Microwave integrated circuit design, VLSI design and embedded systems.

27. **Madhu N. Belur**
Systems & Control theory, Behavioral theory of Systems and Control, Optimal control, Numerical aspects, Hybrid systems

28. 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.

29. Madhav P. Desai
VLSI design and design automation, Graph theory and combinatorics Circuits and systems

30. Mahesh B Patil
Semiconductor device modelling for circuit simulation Semiconductor device simulation, Mixed-mode circuit Simulation.

31. Preeti S. Rao
Speech and Audio Signal Processing, Digital Signal Processing, Coding of speech at low bit-rates

32. Prakash R. Apte
Micro Electro Mechanical Systems(MEMS), Quality and Reliability, Taguchi and TRIZ Methodologies

33. Prasanna Chaporkar
Information theory, Stochastic control, Optimal decision issues

34. Pradeep R. Nair
Nanoscale devices for energy and healthcare applications, Semiconductor device physics and reliability, MEMS

35. Prem C. Pandey
Speech & Signal Processing, Biomedical Signal Processing and Instrumentation, Instrumentation, Embedded Electronic System Design

36. R. K. Shevgaonkar
Fiber Optic Communication; Photonics; Non-linear fibre optics; Antennas; Image Processing; Radio Astronomy; Communication

37. Richard Pinto
Microelectronics

38. Saravanan Vijayakumaran
Digital Communications, Computer Networks, Parallel Simulation Algorithms.

39. S. D. Agashe
Control theory, Network theory, Speech analysis and Synthesis

40. Subhananda Chakrabarti
Microelectronics, Growth, fabrication and characterization of III-VI semiconductor devices

41. Subhasis Chaudhuri
Multimedia, Computer Vision, Image Processing, Pattern Recognition, Biomedical Signal Processing

42. Siddhartha P. Duttagupta
Microelectronics

43. Shalabh Gupta
High speed analog/RF IC design, optical fiber communications, ultra-high-speed data conversion using photonics, smart antenna systems, biomedical electronics and biophotonics.

44. Swaroop Ganguly
Physics and technology of novel nanoscale devices for information-processing and energy-harvesting.

45. S. A. Khaparde
Deregulation in Power Industry: optimal bidding, congestion management, Object Oriented Power System Analysis, Controlled series compensation using SSSC, Harmonic Distortion in Distribution systems, Design and Operation of small tidal powerplant, Modelling and Design of transformer

46. 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

47. Saurabh Lodha
CMOS process integration and device physics, Materials and processes for advanced CMOS devices, Metal-semiconductor interfaces Molecular devices

48. Souvik Mahapatra
Flash EEPROMs, SONOS, Nanoparticle storage, NBTI and Hot carrier degradation in MOSFETs, High-k gate dielectrics

49. S.N. Merchant.
Signal Processing,Adaptive Signal Processing

50. Sachin Patkar
Combinatorial optimization, Algorithms Design and Analysis, Graph Theory, Geometric Design and Graphics

51. Sibi Raj B. Pillai
Fundamental Limits of Communication Systems Information Theory and its applications, Sensing, Stochastic Modeling, Allocation Problems, Interference Channels Relaying and Broadcasting

52. S. A. Soman

Power System Analysis, Restructuring of Power Systems,Power System Protection, Optimization, Object Oriented Design, Computational Methods

53. Uday B.Desai

Signal Processing, Wireless Communication (Multiuser Detection), Adaptive Signal Processing, Image and Video Processing Wavelets, Biomedical Signal and Image Processing, Artificial Neural Networks

54. Udayan Ganguly

Flash Memory dielectric and structure optimization for traditional scaling, Non-traditional Flash Memory scaling with molecules (e.g. fullerenes, nanotubes), Future FlashMemory replacements.

55. Vivek Agarwal

Power Conversion, Power quality issues, Non-conventional energy, Intelligent control of power electronic systems, Design of electronic systems, Electromagnetic Interference and compatibility (EMI/EMC)

56. Vivek S. Borkar

Stochastic Control, Learning Control Theory, Random Processess.

57. V.M. Gadre

Communications and signal processing with emphasis on multiresolution and wave based methods.

58. V. Rajbabu

Statistical and digital signal processing, Signal processing system design, Particle filter applications, and Target tracking systems.

59. V. Ramgopal Rao

Nanoelectronics, Circuit and System Considerations with Emerging CMOS Technologies(Multigate MOSFETs, Single Halo MOSFETs etc.),

Technolology and Characterization of Sub 100 nm CMOS devices, CMOS Reliability Characterization (plasma damage, radiation, hot-carrier), Bio-MEMS

60. Virendra Singh

Computer Architecture, High Performance Computing, Robust System Design, Fault Tolerant Computing, Testing, Formal Verification, Self-Healing System Design, Design for Testability, SoC/NOC Design and Test, Reconfigurable System Design Hardware Accelerators, Trusted Computing.

61. V. R. Sule

Cryptography: Cryptographic Algorithms Elliptical curve based schemes, Algebraic cryptanalysis of block and stream ciphers satisfiability methods, Boolean equations and analysis. Control Theory: Feedback system design, Computational Methods for dynamic systems.

Energy Science & Engineering

Introduction

The Department of Energy Science and Engineering is a young department started in 2008. Prior to this, it existed as an interdisciplinary group for over twenty five years. The department aims to provide manpower and research inputs that are critical for the growth of India's energy sector and also endeavours to provide innovative energy technologies and systems to mitigate the global problem of climate change. Currently, the department offers an integrated B.Tech.-M.Tech. dual degree programme and an integrated M.Sc.-Ph.D. dual degree programme, in addition to the conventional M.Tech. (Energy Systems Engineering) and Ph.D.programmes. There are at present 16 core faculty members and 30 associated faculty members from across the institute.

Academic Programmes

The different academic programmes in the department are aligned with the rapidly increasing needs of the nation's energy sector and directed at providing human resources to address and contribute towards the same. The high-quality training provided in the department hones the student skills in understanding the science and technology of energy systems thus creating innovators, scientists, and engineers who can contribute meaningfully to the needs of the nation. Today, more than 500 alumni occupy various positions in industry and research institutions.

Scholarships have been funded by MERC (2), Forbes Marshall (1), and NCPRE (2).

The interdisciplinary nature of the course brings together faculty members and students with diverse backgrounds and interests in engineering (Energy, Mechanical, Electrical, Civil, Materials, etc.) and science (Physics, Chemistry, Maths, etc.). In the course of their pursuits for a degree, students are exposed to core areas of energy management including energy auditing, energy systems modeling and analysis, non-conventional energy sources, to name a few. In addition, students take elective courses in their areas of specialization. The department also interacts with the industry (consultancy, sponsored projects), research institutions (seminars, workshops), and policy makers (seminars, workshops) for developing and promoting clean and efficient energy technologies in the country. The programme is well recognized by the industry with fellowships and sponsorships from various organizations, viz., Forbes Marshall, ONGC, Cummins, and MNRE. In the 2011 batch, students got placed in various companies, and more than 70 per cent of the students registered for placement have already secured a job.

Degrees Awarded: 18	
Dual Degree	
(B.Tech./MTech.)	: 1st batch to pass out in 2013
M.Tech.	: 13
Ph.D.	: 5

The minor courses offered are : Energy Resource, Environment, and Economics; Energy Management; Introduction to Renewable Energy; Hydrogen Energy; Wind Energy Conversion; Introduction to Solar Photovoltaics; Advanced Solar Technology; and Conservation of Energy in Buildings.

R&D Activities

Sponsored Research Projects

Total number 30	
New	: 3
Ongoing	: 23
Completed	: 4

List of sponsored research projects :

Project Title	Sponsoring Agency	Status (New/ Ongoing/Complete
"Design and Development of Vacuum Pyrolysis Plant to Process Various Agricultural and Agro-Industrial Biomass to Demonstrate Its Technical and Economical Feasibility"	MNRE	Ongoing
"Studies on Underground Coal Gasification for Indian Coals-II"	ONGC	Ongoing
"Cummins Engine Research Facility"	Cummins	Ongoing
"Solar Energy Research Initiative for India and US (SERIIUS)"	DST	New
"Metal Oxide ALD"	Applied Materials	Ongoing
"Deposition of Multilayer Quantum Well Structures of Metal Chalcogenides by ALD."	Board of Research in Nuclear Science	Ongoing
"Direct Regeneration of the Ultra Thin Semiconductor Absorber Layer by Electronic Conductors for Solid State Semiconductor Sensitized Solar Cells"	Department of Science & Technology	Ongoing
"Development of Solid State Nanocrystalline Semiconductor Sensitized Solar Cells by Inverted Morphology"	Defence Research & Development Organisation	Ongoing (Shared)
"Development of Semiconductor Sensitized Solar Cell"	NCPRE-MNRE	Ongoing(Shared)
"Development of Transparent Conducting Oxides"	NCPRE-MNRE	Ongoing(Shared)
"Characterization of Thin Film Si for Solar Cell Application"	Applied Materials	Completed
"Stability and Performance of Photovoltaics"	Department of Science and Technology and Research Councils UK	Ongoing
"Characterization of solar cells and material by active infrared thermography"	IRCC, IIT Bombay	Ongoing
"Development of a Megawatt-scale National Solar Thermal Power Testing, Simulation and Research Facility"	MNRE	Ongoing
"Development of Efficient and Cost-Effective Electrocatalysts for Oxygen Reduction Reaction (ORR) in Low Temperature Fuel Cells"	DST	Ongoing
"Development of electrocatalysts for low temperature fuel cells"	IRCC	Completed
"Development and commercialization of low temperature polymer electrolyte membrane fuel cell"	DST	Ongoing

Project Title	Sponsoring Agency	Status (New/ Ongoing/Complete
"Solar Heat For Drying Na_2SO_4"	Seed Heavy water Board	Completed
"Wastewater, minimization in batch plants through on-site treatment, reuse and recycle processes"	DST	Ongoing
"Dynamic Data Driven Model Based Predictive Control of Nuclear Steam Generator"	Board of Research in Nuclear Sciences	Ongoing
"Development of a Megawatt-scale Solar Thermal Power Testing, Simulation and Research Facility"	MNRE	Ongoing
"Analysis of Hybrid Storage Solar PV Systems"	DST	New
"Power Quality and Control in Microgrids"	National Centre for Photovoltaic Research and Education	Ongoing
"Peer-to-Peer Control of Distributed Energy Resources for improving Voltage and Frequency Profile in MicroGrids"	DST	Ongoing
"Investigation of Dynamic Stability Phenomena in Microgrid during Islanding and Re-Synchronizing"	IRCC	Ongoing
"SG/ Template synthesis of hollow Metal nanoparticles as high performance Rechargeable Li-ion Battery anode materials"	IRCC-IITB	Completed
"Nanoscale fabrication of aligned nanoarchitectured copper current collectors covered with metal phosphides as anode for next generation Lithium-ion battery applications"	Nano-mission, DST	Ongoing
"Development of low cost cathode materials for Li-ion batteries"	Renault Nissan Tech. and Business Center	Ongoing
"Development of Lithium-ion battery materials for Solar PV storage"	NCPRE-MNRE	Ongoing(Shared)
Saltation of solid particles in pneumatic transport systems	DST	New

Consultancy Projects

The total revenue earnings from consultancy projects is Rs. 27,84,603.

Patents

- A module for extracting water from air for drinking and cleaning purposes, C.S.Solanki and Anil Kottantharayil ,MehulRaval, Jim John Joseph, filed on September 2011, (2048/MUM2011).
- Solar flux mapping" J.K. Nayak, S.B. Kedare, M. Prakash, R. Bhalerao and P. Krishnamurthy
- Composition and Method of Generation of Hydrogen by Thermal Decomposition of Ammonia Borane (AB) using Silicon Nanoparticles as Catalyst", A. C. Gangal, P. Kale, P.Sharma (2533/ MUM/2011).

Extension Activities

The department celebrated "Energy Week" in December 2011, which included four events viz.; (1) Global Tech; (2) ICAER 2011; (3) Workshop for ACCESS; and (4) Coal Workshop.

3rd International Conference on Advances in Energy Research (ICAER) 2011

The department hosted the 3rd International Conference on Advances in Energy Research (ICAER) 2011 during December 9-11, 2011. The challenges in energy research and its future trends were discussed at this three-day conference. More than 200 people participated and more than 100 research papers were presented at this conference. Eminent scientists, from India and abroad, offered lectures on their research and had one to one discussion with the students. The conference covered most aspects of the current trends in energy research from Solar Photovoltaics to Energy Policy. The conference converged on an interesting discussing session on "Fundamental Research" attended by eminent industrialists, social activists, scientists and students.

Global Tech

Global Alliance of Technological Universities (GlobalTech) is a consortium of seven premier technological universities that includes IIT Bombay, California Institute of Technology, Nanyang Technological University Singapore, Eidgenössische Technische Hochschule (ETH Zurich), Imperial College London, Georgia Institute of Technology Atlanta and Shanghai Jiao Tong University. As a partner institute in the GlobalTech Alliance consortium, IIT Bombay hosted the 3rd GlobalTech Workshop focusing on "Energy Research for Global Sustainability". The workshop was held on 7th and 8th December 2011 at IIT Bombay. Top researchers and members of the seven eminent institutions presented and gave insightful talks on energy-related themes like Low Carbon Cities, Distributed Energy Systems/Smart Grids, Cost Effective Energy Storage Solution, Energy Policy and Impact on Society, Innovation and R&D in energy, etc.

Energy Day 2012

"Energy Day" was celebrated on March 17 and 18, 2012. The first day was dedicated to the postgraduate students and the second day to the undergraduate students of the department. More than 100 delegates from different industries and organisations attended the presentations of the students. The occasion brought together an intermingling of ideas from industry and academic world to foster sustainable development which is the benchmark of growth. "Energy Day" involved the wider public in a broad range of activities related to the production and use of renewable energy and energy efficiency. "Energy Day" also brought the postgraduate students in direct contact with the industry to strengthen the industry-academia relationship. The interactions involved students showcasing their research work, poster presentations, and panel discussions. The project topics for the poster presentations were: Solar Energy Utilization; Power and Energy; Green Energy; Technology for Energy.

The topic for this year's panel discussion was "Is the Age of Oil Nearing An End?" The panelists held a discussion and presented their views on this topic– not just relevant to the energy scenario existing today, but also important to set the energy goals for the future.

The second part of "Energy Day" was Helios, which was a one-of-a-kind platform for undergraduate students to rub shoulders with the academia, entrepreneurs, industry bigwigs and policy makers from the fields of energy and sustainability. The inaugural event on March 18, 2012, featured competitions, workshops, quizzes, lectures, exhibitions, etc., on a plethora of topics such as energy efficiency, green buildings, entrepreneurship, solar photovoltaics, policy-making and much more.

CEP Courses

International Course on "Defining Energy Futures in India and Canada" for University of Toronto students from 10th - 27th May 2011

Visitors to the Department

Dr. Biraj Kumar Kakati, Assistant Professor, IIT Guwahati, delivered lecture on "Development of Graphene Reinforced Composite Bipolar Plate for Proton Exchange Membrane Fuel Cell" (January 6, 2012)

Dr.Prabeer Barpanda, Department of Chemical System Engineering, The University of Tokyo, Japan, delivered lecture on "Synthesis of Novel Fluorosulphate ($AMSO_4F$) and Pyrophosphate ($A_2MP_2O_7$)Polyanionic Cathode Systems for Rechargeable Li-ion Batteries" (January 13, 2012)

Dr Sankara Sarma V Tatiparti, Research Scientist, General Motors R&D, delivered lecture on "Mg-based Nanomaterials for On-board Vehicular Hydrogen Storage Applications" (January 24, 2012)

Dr. Priya Johari, School of Engineering, Brown University, Providence RI 02912, USA, delivered lecture on "Ab-initio Computations of Si anode in Lion Batteries" (February 29, 2012)

Mr. Soumitra Satapathi, University of Massachusetts, Lowell, MA, delivered lecture on "Harvesting Energy from the Sun-The Future of Renewable Energy" (Feburary 16, 2012)

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

Kumar, N., Singh, N., Doshi, J. B
"Formulation of Navier-Stokes Equation by Nodal Integral Method", *13th Annual AeSI CFD Symposium Bangalore*, India, Aug 11-12, 2011

Sahoo, S.S., Singh, S., Banerjee, R.
"Experimental and Computational Investigation into the Heat Loss from the Cavity Receiver used in Linear Fresnel Reflector Solar Thermal System", *International Conference on Advances in Energy Research,* Mumbai, Dec 9-11, 2011.

Sahoo, S.S., Singh, S., Banerjee, R.
"Hydrothermal Analysis of Absorber Tube of Linear Fresnel Reflector for Solar Thermal Applications", *21st national and 9th ISHMT-ASME Heat and Mass Transfer Conference*, Chennai, Dec 27-30,2011.

Sahoo, S. S., Varghese, S.M., Kumar, C.S., Viswanathan, S.P., Singh, S., Banerjee, R.
"Experimental Investigation of Convective Flow Boiling in the Absorber Tube of the Linear Fresnel reflector solar thermal system" *SOLARIS*, Varanasi, Feb 7-9, 2012.

Singh, S., Mousseau, V.
"Interfacial Pressure for the Compressible Two-Phase Two-Fluid Model", *International Conference on Nuclear Engineering*, Makuhari, Chiba, Japan, May 16-19, 2011.

Singh, S., Rizwan-uddin, Kumar, N.
"Numerical Study of Natural Convection in Open Inclined Cubic Cavity using Parallel Modified Nodal Integral Method", *21st national and 9th ISHMT-ASME Heat and Mass Transfer Conference*, Chennai ,Dec 27-30, 2011.

Somasundaran, P., Nandi, D.K., Gupta, R.
"Simulation and Characterization of Shunts in Silicon Solar Cells by Pspice and Lock-in Infrared Thermography", *Solar Asia-2011 International Conference: Solar Energy Materials, Solar Cells and Solar Energy Applications,* Proc.pp.277-283, 2011

Neergat, M., Rahul, R.
"ORR activity and Methanol Tolerance of Carbon Supported Pd Alloys - a Comparison with Pt Catalyst", *219th ECS Meeting*, held during May 1-6, 2011, at Montreal, Canada.

"Unsupported (Pt-Cu) Core-shell Nanoparticles – oxygen reduction reaction (ORR) Catalyst with better activity and reduced precious metal content", *219th ECS Meeting*, May 1-6, 2011, at Montreal, Canada.

Neergat, M., Singh, R.K.
"Oxygen Reduction reaction (ORR) on Ir, Rh, and Ru selenides", *15th European Fuel Cell Forum Conference*, June 28–July 01, 2011, at Lucern, Switzerland.

Wasim, F. G. S.,Ladewig,B. P.,Neergat, M.
"Methanol Tolerance of Pt-Co Catalysts", *15th European Fuel Cell Forum Conference*, June 28–July 01, 2011, at Lucern, Switzerland.

Panchal, V., Lahoti, G., Apte, P., Bhandarkar, U., Neergat, M.
"Effect of Process Parameters on the Synthesis of Iron Nanoparticles using a Low Pressure Plasma", *International Conference on Materials for Advanced Technologies*, June 13-16, 2011, Singapore.

Tan R. R., Aviso K. B, Bandyopadhyay S., and Ng D. K. S.
"A Multi-Period Integer Programming Model for Optimal Source-Sink Matching in Carbon Capture and Storage Systems with Time Constraints", *31st Annual PAASE Meeting and Symposium*, June 15-18, 2011, Manila, Philippines.

Krishna Priya G.S. and Bandyopadhyay S.
"Optimum Sizing of Standalone Photovoltaic Thermal (PVT) Systems using Design Space Approach", *31st Annual PAASE Meeting and Symposium,* June 15-18, 2011Manila, Philippines.

Sahu G. C. and Bandyopadhyay S.
"Energy Targeting in Heat Integrated Water Networks with Isothermal Mixing", *European Symposium on Computer Aided Process Engineering —21 (ESCAPE-21)*, May 29-June 1, 2011 Thessalonica, Greece,.

Bandyopadhyay S.
"Design of Renewable Energy Systems Incorporating Uncertainties through Pinch Analysis", *Proceedings of European Symposium on Computer Aided Process Engineering —21 (ESCAPE-21),* May 29-June 1, 2011, Thessaloniki, Greece.

Parikh N, Patwardhan S, Bandyopadhyay S. and Gudi R.
"Control of a Nuclear Steam Generator using Feedback-Feedforward LQG Controller", 2011. *International Symposium on Advanced Control of Industrial Processes (ADCONIP 2011), art. no. 5930463 , pp. 415-420,* May 23-26, 2011, Zhejiang, China,.

Sahu G. C. and Bandyopadhyay S.
"Minimization of Resource Requirement and Inter-Plant Cross Flow Across Resource Allocation Networks", *14th Conference on Process Integration, Modeling and Optimisation for Energy Saving and Pollution Reduction (PRES 2011) in conjunction*

with 10th International Conference on Chemical and Process Engineering (ICheaP) May 8-11, 2011, Florence, Italy.

Nunna, H.S.V.S.K., Doolla, S.
"Demand Response in Smart Microgrids", *IEEE International Conference on Smart Grid Technologies* (2011), Kerala, India, 2-4 December 2011.

R. Jilte, S.B. Kedare and J.K. Nayak
"Comparison of Cavity Receivers with and Without Mouth-blockage of Different Shapes and Sizes used in Paraboloid Dish Applications", *International Conference on Energy Security, Global Warming and Sustainable Climate, SOLARIS 2012*, February 7 – 9, 2012, Varanasi, India.

J. Prajapati and J.K. Nayak
"Thermal Performance and Design Guidelines of a Commercial Building under Hot and Dry Climates of India", *International Conference on Energy Security, Global Warming and Sustainable Climate, SOLARIS 2012*, February 7 – 9, 2012, Varanasi, India.

Doolla, S., Priolkar, J.
"Analysis of Frequency Control in Isolated Microgrids", *IEEE International Conference on Smart Grid Technologies* (2011), Kerala, India, 2-4 December 2011.

Srinivasan, N.R., Mitra, S., Bandyopadhyay, R.
"Enhanced Cyclic Stability and Lithium Storage Capacity of SnO2-Mesoporous Carbon Composite", *6th Asian Conference on Electrochemical Power Sources* on Jan 5-8, 2012, Chennai, Tamil Nadu, India.

Chandrasekhar, M.S., Mitra, S.
"Electrochemical Performance of Li-Zn-P System as Anode Material for Lithium-ion Battery Application", *6th Asian Conference on Electrochemical Power Sources* on Jan 5-8, 2012, Chennai, Tamil Nadu, India.

Bose, M.
"Prediction of Saltation Velocity in Pneumatic Conveying System", *IUTAM Symposium on Mobile Particulate Systems*, Bangalore, 23-27 January 2012

Conferences/Symposia/Workshops/ Seminars (Coordinated/Chaired by Faculty)

Anuradda Ganesh
Organiser for the *3rd Indo-German Frontiers of Engineering Symposium* held from 16th-19thJune, 2011 at Khandala.

Organiser for the *3rdGlobalTech Workshop on Energy Research for Global Sustainability* held on 7th and 8th December, 2011 at IIT Bombay

Manoj Neergat and Shaibal Sarkar
ICAER 2011, Joint Organisers, December 09–11, 2011, IIT Bombay.

Banerjee, R.
Coordinated the One week *Continuing Education Programme on Energy Management*, held on November 21-25, 2011, at Guest House Conference Hall, IIT Bombay, Mumbai. India.

Bose, M.
Coordinated an International Conference (Member Organising Committee), *IUTAM Symposium on Mobile Particulate Systems*; Bangalore, 23-27 January 2012

Nayak, J.K.
Session on *Solar Thermal -I* in ICAER, December 9-11, 2011

Neergat, M.
Chaired a session on "Fuel Cell Diagnostics (B12)" at the *International Conference on Fuel Cell and Hydrogen,* European Fuel Cell Forum (EFCF) 2011, Lucerne, Switzerland.

Solanki, Chetan Singh
Coordinated and conducted the *1000 Teachers Programme*, held on December12-22, 2011, at NCPRE,IIT Bombay.

Coordinated and conducted the Labs as a part of *1000 Teachers Programme*, LAB course held on September, 2011, at NCPRE,IIT Bombay.

Coordinated and conducted the Theory as a part of *1000 Teachers Programme*, Theory course held on April 11-14, 2011, at NCPRE,IIT Bombay.

Invited Lectures

Solanki, Chetan Singh
"Si-Nano structure for solar cell Application", *INUP CEP Workshop* at IIT Bombay, 24 April2012

" Losses in Solar Cells and Strategies",*Three-Day CEP Course*, by NCPRE, IIT Bombay 19April2012.

"Si-Nano structure for solar cell Application" *INUP Workshop* at IIT Bombay, April9,2012.

"Technology Selection for PV Power Plants " GERMI, Gandhinagar, Gujrat, February 2012.

"National Center for PhotovoltaicResearch and Education (NCPRE) and Its Activities," MANIT, Bhopal January, 2012.

"Introduction to Solar PV Technologies ", Solar Photovoltaic Energy, Vijaywada November 2011.

"Introduction to Solar PV Technologies" KonkanGyanpeeth College of Engineering Karjat, Raigad, Maharashtra, India November 2011

Banerjee, R.B.
"Status of Technology for Distributed Generation of Power," *RuDicon 2012 - Conference 'Rural Energy Security through Distributed Clean Power Generation* at Indian Merchants Chamber, Mumbai, January 19, 2012.

"Role of PV in India," during the Panel Discussion of *AMAT-IITB Workshop*, IIT Bombay, December 13, 2011.

"International Collaboration for Energy in India", delivered at Indo-Swiss Energy and Development Symposium on *"Energy in India: Governance and Geopolitics in the Context of Global Challenges"* at MDC Hall, IIM Bangalore, November 28, 2011.

"Integration of Renewables in the power sector." Jadavpur University, Kolkata, September 15, 2011.

"Modelling of Energy Systems," Bengal University Shibpur, September 14, 2011.

Keynote lecture on "Green Energy for Future Sustainable Energy Systems" delivered at *6th Symposium on National Frontiers of Engineering (NatFOE)*, IIT Hyderabad, September 3, 2011.

"Energy in India – Status and Future," *Indo-Canadian CEP Course - Defining Energy Futures in India and Canada*, IIT Bombay, May 10, 2011.

Doolla, S.
"Power Evacuation and Smart Metering", *SPV Power Plant Design and Installation Workshop,* GERMI, Gandhi Nagar, February 21-23, 2012

"Energy Efficient Lighting", *Continuing Education Program on Energy Mangement* at IIT Bombay, 24 November,2011

"Distributed Generation (Mini &Microgrids)", *SOLARCON2011- Short course on -Grid Connected PV Power Systems*- November 8-10, 2011, Hitex, Hyderabad

Mitra, S.
"Batteries and Energy Storage Systems", *NCPRE-SEMI short course* in Jaipur - 24-25-26th August 2011

"Advanced Nanostructured Materials for Lithium-ion Batteries", Mumbai University, Aug 2011

Nayak, J.K.
"Solar Thermal Power" in *International Conference on Advances in Energy Research (ICAER)* (Session 1B) on December 11, 2011 held in IIT Bombay during December 9-11, 2011.

"Solar Thermal Power in India" in *International Conference on Energy Security, Global Warming and Sustainable Climate, SOLARIS 2012*, February 7 – 9, 2012, Varanasi, India.

Banerjee, R.B.
"Distributed Generation and Isolated Systems in India," at Politecnico di Milano - Piazza L. da Vinci, Milan, Italy, May 17, 2011.

Significant Awards and Distinctions

Doolla, S.
Member of Executive Committee, IEEE Bombay Section; Board of Studies, Jawaharlal Nehru Technological University; and DSM Consultation Committee, Maharashtra Electricity Regulatory Commission

Solanki, Chetan Singh
Chief Guest in KeshavDham, Khandwa on World Disabled Day on December 3,2011, and Chief Guest in "India and 21st Century" function at Harda, Madhya Pradesh on 8th January 2012, organized by PragyaPravah Munch

Honorary Work

Sarkar, S.
Reviewed several research proposals from CSIR, DST, and proposal for IUNAP-IITB 2010

Gupta, R.
Reviewed paper of Emerging Material Research Journal, October 2011

Nayak, J.K.
Member, R&D Committee for Solar Thermal Energy, MNRE, Govt. of India.
Served as Associate Editor, Solar Energy, and Reviewer for SESI Journal

Neergat, M.
Reviewed papers for International Conference on Advances in Energy Research, IITB (2007, 2009, 2011).; 21st National and 10th ISHMT-ASME Heat and Mass Transfer Conference 27-30 December, 2011, IITM (Chennai).; International Journal of Hydrogen Energy; ACS catalysts; Journal of Physical Chemistry; and International Journal of Energy Technology and Policy

Banerjee, R.
Served as Member of the Executive Committee of the Post Graduate Programme in Banking and Finance of the National Institute of Bank Management for a period of three years commencing from September 24, 2011.; Member of the Working Group on New and Renewable Energy for the Twelfth Five Year Plan (2012-17) of Ministry of New and Renewable Energy, Govt. of India, New Delhi.; Member of the academic Advisory Board for the TERI (The Energy and Resources Institute) Higher Education publishing programme (2011-2013).

Doolla, S.
Reviewed Papers for IEEE Transactions on Industrial Electronics; IEEE Transactions on Smart Grid; and IET Renewable Power Generation

Mitra, S.
Reviewed several research proposals for (CSIR) and DST projects and several research papers of Nano lett, J. Phys. Chem C, J. Phys. Chem. L, J. Mater. Chem., Nanoscale etc.

Faculty Members and their Specializations

1. SantanuBandopadhyay
Pinch analysis and Energy integration, Modelling and analysis

2. Rangan Banerjee
Energy Efficiency, Energy Modelling, Hydrogen Energy

3. Manaswita Bose
Complex Fluid Dynamics, Flow of Granular Materials, Multiphase flows, Computational Fluid Dynamics, Molecular Dynamic Simulation of Particulate Flows and Coal Gasification and Combustion

4. SuryanarayanDoolla
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. Balasubramaniam Kavaipatti
Materials development for artificial photosynthesis, photovoltaics, transparent conductors

9. S.B. Kedare
Concentrating Solar Collectors, Industrial thermal hybrid systems

10. SagarMitra
Nanostructured Materials, Lithium ion Batteries, Hybrid vehicles, Electrochemical Energy storage, Electrochemistry of Nanomaterials, Electrochemistry of Semiconductors

11. J.K. Nayak
Passive solar architecture, Solar thermal

12. ManojNeergat
Fuel cells, Electrocatalysis, and Bio-fuel cells

13. Shaibal K. Sarkar
Sensitized Solar cells, Photoelectrochemistry, Nanocrystalline Materials for Photovoltaic applications, Transparent Conducting Oxides, Atomic Layer Deposition

14. Pratibha Sharma
Hydrogen Storage, Thin films, Amorphous Semiconductors, Ion Irradiation, Chalcogenides

15. Suneet Singh
Nuclear reactor thermal hydraulics and safety, Advanced numerical methods for neutron diffusion and fluid flow, Two-phase flow modeling

16. Chetan Singh Solanki
Solar Photovoltaics, Thinfilm silicon solar cells, PV solar concentrators, Porous silicon, Carbon nano tubes (CNT's)

Associated Faculty

Mechanical Engineering

17. Atul Sharma
Computational fluid flow and heat transfer

18. S. Suryanarayanan
Automatic control, Mechatronics

19. A. Sridharan
Two phase heat transfer, Experimental heat transfer

20. S.V. Prabhu
Flow metering, Gas turbine blade cooling, Two phase flow and heat ransfer

21. R.P. Vedula
Convective heat transfer for external and internal flows

22. A.W. Date
Numerical fluid flow and heat transfer, Appropriate technology

23. J.B. Doshi
Nuclear reactor theory, Nuclear reactor safety, Analytical methods in engineering

24. U.N. Gaitonde
Thermodynamics, Heat transfer engineering, Power plant engineering

25. Kannan N. Iyer
Nuclear reactor safety, Thermal hydraulics, Applied numerical methods

26. M.V. Rane
Waste heat recovery systems, Refrigeration systems, Heat pumps

27. S.P. Sukhatme
Heat transfer, Energy

28. Upendra V. Bhandarkar
Low pressure plasmas, Heat transfer and Thermodynamics, Statistical mechanics

29. Bhalchandra Puranik
Gas dynamics, Shock-wave density interface interactions, Thermal hydraulics

30. S.L. Bapat
Cryogenics, Refrigeration, Airconditioning

Electrical Engineering

31. VivekAgarwal
Power conversion, Modelling and simulation of power electronic systems

32. M.C. Chandorkar
Electrical drives, Power electronic converters and control

33. B.G. Fernandes
Switch mode rectifiers and power supplies, Soft switching methods for SMPS

34. S.A. Khaparde
Deregulation in power industry: optimal bidding and congestion management

35. K. Chatterjee
Utility friendly converter topologies, Power factor correction techniques

36. A.M. Kulkarni
Power system dynamics, Flexible AC transmission systems

37. S.V. Kulkarni
Transformer design and analysis, Finite element method and computations

38. S.A. Soman
Power system analysis, Restructuring of power systems

Chemical Engineering

39. Chandra Venkatraman
Aerosols and climate, Air pollution, Toxicity/Risk assessment

40. Sanjay Mahajani
Underground coal gassification, Reaction engineering, Bio-fuels

41. R.K. Malik
Process modeling, Simulation, Energy Integration

Aerospace Engineering

42. K. Sudhakar
Multidisciplinary design optimization

Metallurgical Engineering and Material Science

43. Rajiv O. Dusane
Synthesis and characterization of amorphous and microcrystalline thin films

Centre for Environmental Science and Engineering

44. VirendraSethi
Combustion aerosols, Energy and environment

Centre for Technology Alternatives in Rural Areas

45. N.G. Shah
Post Harvest Process Engineering, Small Scale Renewable Energy Applications and Agro-based Industrial Development

46. Anand B. Rao
Energy and environment, Climate change, Carbon capture and sequestration

Humanities & Social Sciences

Introduction

The Department of Humanities and Social Sciences plays a distinctive and significant role in an institute of national importance 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 ethically strong society. Therefore, there is a need for relating the science and technology education to liberal arts and social sciences. Right from its inception, IITs 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, viz., Economics, English, Philosophy, Psychology, Sociology, and areas touching upon the Cell for Indian Science and Technology in Sanskrit (CISTS). Founded in 1958, the department has weaved the goals mentioned above into its teaching and research programmes. It has expanded in the recent years and has at present 33 faculty members on its roll. The department has well-equipped computing facilities, which include several statistical packages. It also 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. The guiding principles for the teaching programme at the Undergraduate level are:

- To combine technical education with general/liberal education with a view to providing complete education.
- To sensitise 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 specialised job, but also to cultivate good intellectual habits, skills, and understanding that any educated person should have regardless of the kind of profession s/he undertakes.

The department endeavours for realising these objectives by offering the following courses at the Under-graduate 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. Specialised 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.

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. & Ph.D. programmes at the department level. 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

A 4-semester interdisciplinary M.Phil. programme with specialisation 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 the institute is contributing substantially in meeting this manpower requirement. There are 27 students pursuing the M.Phil. programme presently. It is worthy of note that most of the students in the earlier batches who have completed their studies and obtained M.Phil. degree from this institute have got placements in universities and in reputed and established commercial units and non-governmental organisations (NGOs). Also, many of them have successfully pursued Ph.D. programme in the institute and elsewhere.

The Ph.D. programme in the department is generally discipline-oriented and runs in five disciplines and areas related to the Cell for Indian Science and Technology in Sanskrit. There is also ample provision to do research in interdisciplinary areas. In the year under review 12 students of this Department will be awarded Ph.D. degree. Since the inception of the Ph.D. Programme in the Department, 156 students have already obtained their Ph.D. degree from the department and are well-placed in institutions like Reserve Bank of India, I.I.M. Calcutta, Bombay University, Central University, Hyderabad, and other IITs. They have made their mark as excellent academicians and professionals in their respective fields of specialisation. There are 39 regular, 13 external, 10 college teachers, 19 self-financing, 1 Institute Staff, and 3 project staff candidates, who are currently enrolled in the Ph.D. programme.

Degrees Awarded	
M. Phil	: 11
Ph.D.	: 20

R & D Activities

Details about sponsored projects and consultancy jobs undertaken in the year 2011-12, in the department are as follows:

Sponsored Research Projects	
New	: 3
Ongoing	: 12
Completed	: 5
Faculty Involved	: 8
Sanctioned Outlay	: 1117800
Consultancy Projects	
No of Jobs	: 6
Faculty involved	: 5
Income generated	: 1898230

List of Sponsored Research Projects

New

"Development and Evolution of Sanskrit Word -Net (Phase II)", Central Institute of Indian Languages

"Role of Investigating Style, Police Interrogation & Confession in Indian Context: An empirical Investigation", Bureau of Police Research and Development

"Pilot Project to Reuse the Rubble", IIT Bombay

Ongoing

"Contemporary Indian Philosophy", NPTEL, MHRD

"Development of Calculus in India : A Study on the Works of Sankara Variyar", National Academy of Sciences, India

"Identifying Causal Factors and Cognitive Precursors of Dyslexia: Phycholinguistic and Psychophysical Approaches", Department of Science & Technology, Govt. of India

"Evolution and Development of Sanskrit WordNet", Ministry of HRD, Govt. of India

"Indian Language Corpora Initiative", Ministry of CIT, Govt. of India

"International Conference on Globalization and India: Addressing the Challenges", sponsored by Private Organisations

"Neural Correlates of Implementation Intention Across Age", IRCC, IIT Bombay

"Preparation of Books and Exhibits Highlighting Indian Contributions to the Development of Mathematics", OCL India Ltd., Delhi

"Preparation of Translation & Mathematical Notes of the Works of Nilakantha", Indian National Science Academy

"Prospective Memory and Aging in Medical Adherence: Technology Intervention for Elderly individuals", Department of Science & Technology

"Socioeconomic & Cultural - The Ganga River Basin Management Project (GRBMP)", Ministry of Environment & Forests

"Sponsorship Towards Creating a Logic Base at IIT Bombay", sponsored by Private Organisations

"The video course titled, "Understanding Creativity and Creative Writing", NPTEL (Phase II) MHRD

"To Investigate Role of Impulsivity, Reward & Loss Sensitivity in Decisions Making during Gambling Task: An Empirical Study", IRCC, IIT Bombay

"Towards a Critical Edition of the Kasikavrtti", British Academy, UK (in Collaboration with the University of Cambridge)

"Translation of Jatismuddesha of Bhartrhari's Vakyapadiya along with the Commentary, Prakirna-Prakasa by Helaraja", Indian Council of Philosophical Research, Ministry of HRD, Govt. of India.

Completed

"Award of General Fellowship to Dr. Akoijam Thoibisana to Work on Research Project Entitled Radical Sociality and the Problem of Relational Ethics: Heidegger and Levinas", Indian Council of Philosophical research

"Development & Evolution of Sanskrit Word-Net", Central Institute of Indian Languages

"Economics of Small Businesses in Developing Countries: Part II (Development of course for class+ MDP+CEP)", Wadhwani Foundation

"Payment for Ecosystem Services: Feasibility Study for Lake Armenia", UNOPS

"The Economics of Ecosystems and Biodiversity, Phase II, The United Nations Environment Programme

Visitors to the Departments

Dr. Swati Ganguly, Associate Professor, DEOMEL, *Visva-Bharati*, Santiniketan. She delivered the Institute Colloquium titled *Visva-Bharati: Tagore's 'life's best treasure'* on 19th October 2011 as part of the celebrations for Gurudev Rabindranath Tagore's 150th Birth Anniversary.

Padma Bhushan Professor André Béteille, Professor Emeritus, University of Delhi, visited the institute and the department. He delivered an Institute Colloquium on 'The Institutions of Democracy', on 9th February 2012.

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

Bairy T. S. R.
"Studying the Brahmins: A Framework," *Seminar on Locations of Caste: Social Memory and Social Change in Contemporary India,* organized by the Dr. Ambedkar Centre for Social Justice, University of Mumbai from 20.02.2012 to 22.02.2012.

Bhat, P. R.
"Murty on Language and Reality in Advaita," *International Seminar on K. Satchidananda Murty's Philosophy: An Evaluation*, September. 21-24, 2011 Andra University, Vishakapattanam.

"Thought Experiments", *National Seminar On Knowing: East and West*, conducted by Philosophy Department Allahabad University, from 20-23 February 2012.

Epistemology & Metaphysics Sectional President's Address "The Issue of Absolute Epistemology and Metaphysics", I*ndian Philosophical Congress*, 23-25 February 2012, Allahabad University, Allahabad.

"Evolving Concepts of Democracy and Political Morality", ICPR sponsored Seminar on *Moral Crisis in Contemporary Politics*, at Women's College, Patna, 26- 28 February 2012.

Chakraborty, P.
"'Rivers ran in our heads, the tides were in our blood': Landscape, Place, and the Politics of Belonging" in Amitav Ghosh's The Hungry Tide, Canadian Association of Commonwealth Literature and Language Studies (CACLALS) at the *Congress of the Humanities and Social Sciences: Coasts and Continents: Exploring Peoples and Places,* held during May 28-30, 2011, at University of New Brunswick, Fredericton, Canada.

"Woman' as a Political Subject, Women in Collectives: Rabindranath Tagore's GhareBaire and Char Adhyay in Sabitri Roy's Swaralipi," *Rabindranath Tagore: In His Time and Oursheld* during 27-29 February, 2012, at Centre for Comparative Literature, School of Humanities, University of Hyderabad.

George, S. K.
"Levinas and the Non-Western Other" (with Sindhu Poudyal), *International Conference on Being and its Beyond: On Postphenomenological Philosophy*, held during Jan 31-Feb 2, 2012, at the Department of Philosophy, Sree Sankara University of Sanskrit, Kalady, Kerala

Gupta, M.
"Task Difficulty and Time Constraint in Programmer Mutitasking-An Analysis of Prom Performance and CWL," *International Conference on Ergonomics and Human Factors - HWWE 2011 held during Dec 15-17, 2011 at IIT Madras [Jointly with* Sanjram P.K.]

"Examining Relationship between Organizational Structure and Innovation with moderating effect of

Technical Complexity", *Academy of Business Research* held during Nov 11-16, 2011 at Las Vegas (received the Wolf Publishing Best Papers in Management/MIS award http://www.academyofbusinessresearch.com/) [Jointly with Sahay Y.P.]

"Beyond the P-O Fit Model, *Hawaii International Social Science Conference*, held during June 1-4, 2011, at Honolulu, Hawaii, USA

Gundimeda, H.
"Biodiversity, Food Security and Energy Nexus: Perspectives from TEEB", *Food Security and Energy Nexus, Bonn Conference*, December 16th – 18th, 2011.

"GDP of the Poor", *Green Economy Conference, ICIMOD*, September 6th – 8th, 2011.

"Environmental Dependence for Subsistence: Analysis for Indian States", The *Economics of Ecosystems and Biodiversity Conference*, Leipzig, Germany.

"Environmental Income of the Poor: An analysis for Indian states" at *48th Annual Conference of the Indian Econometric Association,* during 1st to 3rd March, 2012.

"Accounting for Land and Water Resources in the National Accounts" at at the *Indian Society for Ecological Economics Conference*, 19th – 22nd October, 2011, Hyderabad".

Jung, P.G.
"Myth of the Gurkhas: Violence on the Self," *International Seminar on Nepali Diaspora in the Globalized Context,* held during December 2011 at ICSSR-NERC by the Department of Anthropology, North Eastern Hill University, Shillong.

"A Philosophical Sketch of Alfred Korzybski's Works: Text and Context," Special Session on General Semantics during the *International Conference on Language Mind and Reality,* held during March 2012 at the Department of Humanities and Social Sciences, IIT-Bombay, Mumbai.

"The Assumptions of Happiness and its transitions: From Self to Self-Help," *National Seminar on The Enigma of Happiness: A Timeless Pursuit,* held during January 2012 at the Centre of Advanced Study in Philosophy, Utkal University, Bhubaneswar.

"McTaggart's Thesis of Unreality of Time and Sartre's Response: A Construed Dialogue," *National Seminar on Time and Consciousness,* held during January 2012 at the Centre of Advanced Study in Philosophy, Jadavpur University, Kolkata.

Khan, A.
"Personality, Meta-Memory & Task Condition in Prospective Memory Performance, *Society for Applied Research in Memory & Cognition IX* at The Graduate Center, CUNY, NEW York on 27-29th June, 2011.

10th Congress of the French Society for Neuroscience, Marseille, France on 24-27th May, 2011.

Kulkarni, Malhar
"Importance of Developing Lexical e-resources of Sanskrit", *International Conference on Sanskrit and World View,* organized by Uttarakhand Sanskrit University, Haridwar, 9-11 September, 2011.

"Adverbs in Sanskrit: A Computational Overview" with Tanuja Ajotikar at the *World Sanskrit Conference,* Delhi, 5-10 Jan.2012.

"On the Accent of the Word ParachaH w.r.t.Panini 6.2.52" with Anuja Ajotikar at the *World Sanskrit Conference*, Delhi, 5-10 Jan.2012.

"Typology and function of Vat in Astadhyayi" with Dipesh Katira, at the *World Sanskrit Conference,* Delhi, 5-10 Jan.2012.

"A study of IC cut in the Encyclopaedic Dictionary of Sanskrit on Historical Principles" with Prasad Bhide, at the *World Sanskrit Conference*, Delhi, 5-10 Jan.2012.

"Technological tools to understand Svarita" with Leena Hunnargikar, at the *World Sanskrit Conference,* Delhi, 5-10 Jan.2012.

"Parsing Marathi Sentence using Paninian Formalism", presented in a *3-day National Workshop* organized at IIIT Hyderabad on "Dependency Parsing of Indian Languages" 15-17 September 2011.

"Issues in the policy of Historical Sanskrit Dictionary Making", with Prasad Bhide, *9th Brhan Maharashtra Oriental Conference*, Jalgaon, 18-20 November, 2011.

"On the accent of compounds in Panini's grammar", with Anuja Ajotikar, *9th BrhanMaharashtra Oriental Conference,* Jalgaon, 18-20 November, 2011

"Suktiratnakara", *National Seminar on "Vyakrana Manuscripts*" organised by CASS, University of Pune in collaboration with National Mission for Manuscripts on 28th November, 2011.

Narayanan, K.
"Total Factor Productivity and Energy Intensity in Indian Manufacturing: A Cross-sectional Study", *Workshop on Economic Reforms and the Evolution of Productivity in Indian Manufacturing*, during March 18-19th, 2011, at IIT Bombay organized by IIT Bombay; CMD Dharwad and IDPM, School of Environment and Development, University of Manchester, UK & Sponsored by Economic and Social Research Council, UK. [Jointly with Santosh K. Sahu]

"Energy Intensity and Firm Performance: Does Energy Cluster Matter?" *VI Annual International Conference of Knowledge Forum on Agglomeration, Technology Clusters and Networks*, held during November 18-20th, 2011, at the Department of Economics, Goa University, Goa, India [Jointly with Santosh K. Sahu]

"A Comparative Study of Technology and Industry Clusters in India", *VI Annual International Conference of Knowledge Forum on Agglomeration, Technology Clusters and Networks*, held during November 18-20th, 2011, at the Department of Economics, Goa University, Goa, India [Jointly with Rani M. Thomas]

"CO_2 Emission and Firm Heterogeneity: A Study of Metals & Metal based Industries in India", *IEG International Workshop on Towards Greening the Economy*" during February, 22nd, 2012, at Institute of Economic Growth, New Delhi, India [Jointly with Santosh K. Sahu]

"Trends of Mergers and Acquisitions in Indian Manufacturing". International Conference at Sathya Sai Institute of Higher learning, Puttaparthy, during 25th February 2012 [Jointly with Vidhisha Vyas]

"Productivity Heterogeneity and Firm Level Exports: Case of Indian Manufacturing Industry", *The 11th Annual GEP Postgraduate Conference 2012*, held during April 2012 at Leverhulme Centre for Research on Globalisation and Economic Policy (GEP), University of Nottingham, United Kingdom [Jointly with Ronny Thomas]

"Energy Consumption Response to Climate Change: Options for India", *National Seminar on Institution, Structure and Organization in Globalizing India with Special Focus on Science and Technology Economy and Society*, held during January 20-21st, 2012, at IIT Bombay, India [Jointly with Santosh K. Sahu]

"Energy Intensity and Firm Performance: Does Energy Consumption Patterns Matter?", *48th Annual Conference of The Indian Econometric Association*, held during March 1-3rd, 2012 at Pondicherry University, Pondicherry, India [Jointly with Santosh K. Sahu]

"Determinants of Mergers and Acquisitions In Indian Pharmaceuticals Industry", *48th Annual Conference of The Indian Econometric Association*, held during March 1-3rd, , 2012, at Pondicherry University, Pondicherry, India [Jointly with Vidisha D. Vyas]

"R&D Investment and Market Valuation of Firm: A Study of R&D Incurring Manufacturing Firms in India", *48th Annual Conference of The Indian Econometric Association*, held during March 1-3rd, , 2012, at Pondicherry University, Pondicherry, India [Jointly with Pramod K. Naik and Puja Padhi]

"Fertilizer Consumption in India and EKC Hypothesis" *48th Annual Conference of the Indian Econometric Association*, held during March 1-3rd, , 2012, at Pondicherry University, Pondicherry, India [Jointly with Amarendra P. Singh]

Nath, R.

"Pradhan on the Metaphysics of Consciousness" in the *International Conference on Language, Mind & Reality: A Reflection on Philosophical Thoughts of Professor R. C. Pradhan*, held at Department of Humanities and Social Sciences, IIT Bombay, New Delhi, from 5-7 March 2012.

Panda, R. K.

"Moral Identity: A Reflection on Pradhan's the notion of Person and Value" , *Mind, Language and Reality: A Reflection on Philosophical Thoughts of R. C. Pradhan*, Department of Humanities and Social Sciences, March 5-7, 2012.

Panda, R.

Participated and presented a paper entitled, : "Science vs Religion: A Wittgensteinian Perspective", *34th International Wittgenstein Symposium*, held at the Kirchberga m Wechsel/Lowe Austria, from 7th to 13th August 2010.

Participated and presented a paper entitled "Language and Life: A Critical Study in Prof. Pradhan's View on Language", *International Conference on Language, Mind and Reality: A Reflection on Philosophical Thoughts of Professor R. C. Pradhan,* held at Dept. of H & S.S, IIT Bombay, from March 5 to 7, 2012.

Participated and presented a paper entitled "Language as Socially Constructed", *24th Annual Conference of All Odisha Philosophy Association,* held at Choudwar College, Cuttack during 22nd to 23rd January 2012.

Participated and presented a paper on "Philosophy of Radhakrishnan" in a *National Workshop*, which was held at SS College, Shahjahanpur, U.P, during March 24-25, 2012.

Parthasarathy, D.

"Law-breakers and Law-makers: Critical Legal Pluralism, Normative Subjects and Ecological Regimes in India", *International Conference on Legal Pluralism in Natural Resource Management*, Amrita School of Business, Amrita University, Asian Initiative on Legal Pluralis, and Commission on Legal Pluralism, 30-31, March, 2012.

"Enlightenment, Inequality, Post-colonial Development: Rethinking Technocracy in / for India", *International Seminar on "Institution, Structure and Organization in Globalizing India*", Department of Humanities and Social Sciences, Indian Institute of Technology, Bombay, India, 2021 January, 2012.

"The Globalized Politics of In (Equity) and the Colonization of Desire and Leisure in Mumbai and Bangkok", *Urban Aspirations Workshop on Transcendence and Control in a Global Mega City*, Tata Institute for Social Sciences (TISS), Max Planck Institute for the Study of Religious and Ethnic Diversity (MPI), and Partnership for Urban Knowledge Action and Research (PUKAR), Mumbai, 3-3 October, 2011

"Indeterminate' Property, Embedded Resources, and Telescoping legality: Theorizing the Historical Evolution of Mining Governance in India", *Jubilee Congress of the Commission on Legal Pluralism*, 7 to 10 September 2011, University of Cape Town, South Africa

"Theorizing Provincial Capital: Peasants, State, and Economic Transitions in India", *Workshop on Rethinking Economic History: Circulation, exchange and enterprise in India*, Nehru Memorial Museum and Library, New Delhi, 14-15 March 2012

"Sociology@IIT Bombay: Marginality, Pedagogy, Reflexivity", *National Seminar on Sociology in India and the Bombay School: Retrospect and Prospects*, Department of Sociology, University of Mumbai, and Indian Sociological Society, Mumbai, 23-24 September 2011.

Purang P.
"Performance appraisal fairness: An antecedent of work attitudes," at the *21st Annual Convention of the National Academy of Psychology* in December 2011 at Institute of Rural Management Anand (IRMA), Gujrat.

Ramanathan, A.
Participated and presented a paper titled "Decomposition of Environmental Impact of Trade Liberalisation in India" at *6th Biannual Conference of United States Society for Ecological Economics [USSEE],* held at Michigan State University, USA during 26-29 June 2011

Ramasubramanian, K.
"The V*akya M*ethod of Computing Longitudes" in *15th World Sanskrit Conference* held between January 5-10, 2012 [Jointly with Dinesh Mohan Joshi]

"The Golden Age of Indian Mathematics: Contribution of the Kerala School" in the *Workshop for Mathematics Teachers*, IISER, December 28, 2011.

"History of Indian Mathematics and its implications to Mathematical Education" in *National Initiative for Mathematical Education* held on January 22, 2012.

"Construction of Magic Squares using Samputavidhi of Narayana", *National Workshop in Ancient Indian Mathematics"* held between February 24-27, 2012.

Robinson, R.
"Cosmopolitanism versus Religion." *International Workshop on Cosmopolitanism and its Paradoxes,* 8th and 9th September 2011, Tata Institute of Social Sciences, Mumbai.

"History of Christian Communities and their Challenges." Panel presentation in S*eminar on Changing Forms of Communalism and Future of Indian Minorities*, 13th and 14th March, 2012, Jamia Millia Islamia, New Delhi.

"Religious Freedoms and Minorities in India", *National Symposium on Religious Minorities: Issues and challenges in India,* organized by Centre for the Study of Social Exclusion and Inclusive Policy, on 25th January 2012, National Law School of India University, Bengaluru.

"Citizenship, Democracy and the State: the Context of Minorities." *Seminar on Citizenship, the State and Expanding the Boundaries of Democracy,* held on 28th December 2011, Institute for Social and Economic Change, Bengaluru.

"Crisis of Extremisms." Paper presented at the panel on Crisis of Extremisms at the *Indian Sociological Conference,* 11th-13th December 2011, Jawaharlal Nehru University, New Delhi.

"Asian public theology: A sociological perspective." Presidential address delivered at C*onference on Asian Public Theology.* Asian Centre for Cross-Cultural Studies, 7th-9th September 2011, Chennai.

"The Culture of Small Towns." Valedictory address delivered at *National Seminar on Small Cities and Towns in Global Era: Emerging changes and Perspectives.* 29th and 30th August 2011Centre for Development Studies, Tata Institute of Social Sciences, Mumbai.

Sarma, V.
"Verbal Inflection in Hindi: A Distributed Morphology Approach" by Smriti Singh and Vaijayanthi M Sarma. Presented at the *25th Pacific Asia Conference on Language, Information and Computation (PACLIC 2011)*, December 16-18, Nanyang Technological University, Singapore.

"Plural Problems in the Nominal Morphology of Marathi by Shalmalee Pitale and Vaijayanthi Sarma". Presented at the *25th Pacific Asia Conference on Language, Information and Computation (PACLIC 2011),* December 16-18, Nanyang Technological University, Singapore.

Sebastian, C. D.
"Transcendent Metaphysics: A M?dhyamika Critique of Pradhan" *Language Mind and Reality: A Reflection*

on the Philosophical Thought of R. C. Pradhan during 5-7 March 2012 at IIT Bombay, Mumbai.

Shastri, S.
Paper titled "Two Cinematic Reincarnations of Macbeth in Asia: Throne of Blood and Maqbool" at the *National Seminar on Shakespeare and Film*, organized by the Shakespeare Society of India and the IIS University Jaipur, October 13-15, 2011.

Conferences/Symposia/Workshops/ Seminars (Coordinated/Chaired by Faculty)

Narayanan, K.
Coordinated the *VI Annual International Conference of Knowledge Forum on Agglomeration, Technology Clusters and Networks*, held during November 18-20th, 2011, in collaboration with the Department of Economics, Goa University, Goa, India, held at International Centre, Goa.

Panda, R. K.
Mind, Language and Reality: A Reflection on Philosophical Thoughts of R. C. Pradhan, Department of Humanities and Social Sciences, March 5-7, 2012

Robinson, R.
Oganized and coordinated a *Seminar on Institution, Structure and Organization in Globalizing India*, January 20th and 21st 2012, IIT Bombay (with sponsorship from Indian Council of Social Science Research and Council of Scientific and Industrial Research).

Bairy, T. S. R.
Organised the *14th AJEI International Young Researchers' Workshop on Territories, Cities and Urban Societies in South Asia* from 11.03.2012 to 15.03.2012.

Bhat, P. R.
Conducted *Workshop on Philosophical Skill Development for Ph. D. Students of Philosophy* ICPR Academic Centre, Lucknow 1-11 December 2011.

Deb, K.
Discussant for two papers in the *14th AJEI International Young Researchers' Workshop on "Territories, Cities and Urban Societies in South Asia,* held at IIT Bombay from 11th to 15th March 2012

Jung, P.G.
Organized and coordinated a *National Seminar on Self and the Other* in collaboration with Indian Council of Philosophical Research during 19th to 21st, January, 2011.

Kulkarni, M.
Organised a two-day *National Workshop on Part of Speech Tagging of Indian Languages* on 3-4 January, 2012, IITB.

Organised a two-day W*orkshop on Indowordnet* with Pushpak Bhattacharyya on 1-2 January, 2012 IITB.

Khan, A.
Conducted a workshop on *Training Course in Research Methodology on Computer Applications in Social Science Research*, AMU Aligarh, Uttar Pradesh & jointly organized by ICSSR New Delhi (India) on 20-25th March, 2012.

Invited Lectures

Gundimeda, H.
1st Biennial Congress on Urban Green Spaces, invited speaker for the Session on urban biodiversity and valuation. March 6th – 8th, 2012

Key note speaker at the *22nd Biannual Research and Training Workshop* (June 27th to June 30th 2011), Negombo SriLanka, Plenary talk on "How Sustainable is India's Growth"?

Kulkarni, Malhar
"Mrcchakatikam: A Reappraisal", Keynote address delivered at the National Seminar Shah and Parekh College of Arts and Commerce, Kapadvanj, Nadiad, Gujrat on 4th February, 2012.

"Language Diversity in India" at the University of Pavia, Pavia, Italy on 21st March 2012.

"Accent in Panini", at the University of Pavia, Pavia, Italy on 28th March 2012.

"Metalanguage of Panini's Grammar", at the University of Pavia, Pavia, Italy on 14th March 2012.

"Sandhi rules in Panini's Grammar", at the University of Pavia, Pavia, Italy on 7th March 2012.

"Sanskrit Wordnet", at the University of Pavia, Pavia, Italy on 9th March 2012.

"Lexicalizasion of Retrofelx in Panini's grammar", INRIA, Paris on 23rd March, 2012.

"Sanskrit Wordnet", in a *National Workshop on Tools for Processing Sanskrit,* organised by Chinmay International Foundation SS, Velianad, Kerala, 27th December 2011.

"Bracket Parsing of Sanskrit Sentences using Nyaya Terminology" at Faculty of Oriental Studies, University of Cambridge, 20th May, 2011.

"Ganapathas in the Kasikavrtti", Faculty of Oriental Studies, University of Cambridge, 13th May, 2011.

"Status of manuscripts: International Scenario", Keynote address delivered at the inaugural session of a *5-day National Workshop on Preventive Conservation of Manuscripts* at Bharata Itihasa Samshodhaka Mandala, Pune, organized by National Mission for Manuscripts in collaboration with Ananadashram, Pune, 26th September, 2011.

"Samasa in Sanskrit: Some Insights for MutiWord Detection problem in Modern Indian Languages", in a *National Workshop on Processing Multi Words in Indian Langauges*, at the Department of Linguistics, University of Kashmir, Srinagar, Oct. 14-16, 2011.

"Relational Semantics in Multi Words in Indian Languages", together with Amba Kulkarni and Soma Paul, ICON, AU-KBC, Chennai, 15th December, 2011.

"System of Accents in Panini" at the Rashtriya Sanskrit Sansthan, Mumbai Branch, on 16th Jan.2012.

Parthasarathy, D.
"Theories and Concepts of Legal Pluralism: Contemporary Issues", Resource Person lecture at *International Workshop on Legal Pluralism in Natural Resource Management*, Amrita School of Business, Amita University, Asian Initiative on Legal Pluralism, and Commission on Legal Pluralism, 30-31, March, 2012

"Abandoning 'Rule of Law'? Democracy, Domination, and (Il)legal Pluralism in India and Beyond", Plenary Talk, *Jubilee Congress of the Commission on Legal Pluralism,* 7 to 10 September 2011, University of Cape Town, South Africa

"Urbanization and Urban Studies in India", and "Doctoral Research Design and Methodological issues", Resource Person lecture at *Ph.D. Teaching Program in Research Methodology*, Department of Sociology, University of Mumbai

Robinson, R.
"Through the Looking Glass: Indian Catholicism Observed," at the McFarland Centre for Religion, Ethics and Culture, The College of the Holy Cross, Worcester, MA, USA on 9th December 2011.

"Design and Analysis in Religious Studies," in Training course in Research Methodology in Social Science Research organized by Department of Sociology, West Bengal State University, Kolkata, 4th April 2012.

"The Future of Anthropology in a Global Era," in Workshop on Social Networks organized by The Institute of Mathematical Sciences and Indian Institute of Technology Madras Chennai, 22nd February 2012.

"Mute Witness: Interpreting Material Culture," at the Industrial Design Centre, Indian Institute of Technology Bombay, 5th September 2011.

Talwar, N.
Presented the Keynote closing address titled "Performing Alterity: "The Enigmatic Representation of the Scientist as the Cultural Other", in the *International Symposium on Spaces of Alterity: Literary and Dramatic Representations*, during September 9 - 11, 2011, IIT Gandhinagar.

Deb, K.
"Understanding Urban India : Issues in Inclusive and Sustainable Growth", Krantijyoti Savitribai Phule Women's Studies Centre, University of Pune on 26th March 2012.

"Innovations in Teaching Sociology" in the *Workshop on Challenges of Teaching and Doing Research in Sociology,* held on 20th March 2012 at the Department of Sociology, Centre for Advanced Studies, University of Pune.

George, S. K.
"Nature and the Human Being: A Phenomenological Perspective". on 29 Jan 2012 at the *Meeting of the Association for Research in Homeopathy,* Mumbai, on integrative medical care

"Liberal Egalitarian Justice: Rawls and Sen", on 24 Feb 2012 at the *UGC Refresher Course on Democracy and Social Inclusion* held at the Department of Civics and Politics, University of Mumbai.

Jung, P.G.
"Dominance of the Will: Ethics as Self Discipline," for a *National Workshop* on *the question of Ethics and General Semantics* at the Department of English and Modern European Languages, University of Allahabad, Allahabad, September 2011.

"Dominance of the Scientific Method: Ethics as a Discovery of Laws," for a *National Workshop on the question of Ethics and General Semantics* at the Department of English and Modern European Languages, University of Allahabad, Allahabad, September 2011.

Khan, A.
"Realization of Delayed Intention: An Electro-physiological Approach, organized by the Association of Physiologists & Pharmacologists of India, APPICON All India Institute of Medical Sciences, New Delhi, India on 13-17 December, 2011

Narayanan, K.
"Industrial, Trade and Competition Policy in India" at the Narsee Monjee Institute of Management Studies on 8th February 2012.

Purang, P.
"Leadership Development and Effectiveness" for Trent Limited (Tata Group) at Lonavala on 1st October, 2011.

Ramanathan, A.
"Analytical Design of Socio Economic Policy" for the participants of the special lecture series at Centre for Research & Education for Social Transformation[CREST] at Calicut[Kerala] on 11-2-2012

Sebastian, C. D.
"Ethics and Buddhism," the Fourth Avabai B Wadia Memorial Lecture, The K. R. Cama Oriental Institute, Fort, Mumbai, March 11, 2012.

Significant Awards/Distinctions

Gundimeda, H.
"Bharat Jyothi Award" by the India International Friendship Society, New Delhi

Part of expert committee set up by the Prime Minister to prepare a road map for green accounting for India

Elected member of the Indian Society for Ecological economics (INSEE) – Executive committee

First Recipient of the Sir Partha Dasgupta Fellowship for the year 2010, instituted by SANDEE

Khan, A.
International Fellowship for Young Biomedical Scientist by Indian Council of Medical Research India in 2011-12.

Kulkarni, Malhar
Visiting Professor at University of Pavia, Italy in March 2012.

Nominated to Chair the Vyakarana & Linguistics session of the 5th BrhanMaharashtra Oriental Conference, Jalgaon, 18-20 Nov.2011.

Narayanan, K.
Appointed as Institute Chair Professor in the Department of Humanities & Social Sciences, IIT Bombay from January 2012.

Elected as Member of the Executive Board, The Indian Econometric Society.

Appointed as Honarary Treasurer, Forum for Global Knowledge Sharing [http://fgks.in]

Appointed as Member, Board of Studies, Central University of Karnataka, Gulbarga from January 2012.

President, Academy of International Business, India Chapter, till March 2012.

Ramasubramanian, K.
Member, "Committee on Identification …." Ministry of Culture, Government of India (2011-12).

Visiting Academic, University of Canterbury, New Zealand.

Sebastian, C.D.
Honorary Fellow, Centre for Buddhist Studies, School of Humanities, University of Bristol, UK (2010-2011).

Shastri, S.
Recipient of IIT Bombay's *Excellence in Teaching* Award 2011 in recognition of 'significant Contribution to the Teaching Activities of the Institute', September 5, 2011.

Special Mention: One of the Ph.D. theses titled "Exports of Services and Offshore Outsourcing: An Empirical Investigation in the Indian Context" by Dr. P. Brijesh was selected for the EXIM Bank International Economic Development Research Annual [IEDRA] award for the year 2011. This is the second time in a row that this prestigious EXIM Bank IEDRA award is bagged by a Ph.D thesis from the Department of Humanities & Social Sciences, IIT Bombay. The EXIM Bank IEDRA award for 2010 was given to Dr. N. C. Pradhan. Both the theses were guided by Prof. Pushpa Trivedi.

Honorary Work

Bhattacharyya, S.
Reviewer, "Firm Investment, Finance Constraint and Voluntary Asset Sales: the evidence from Indian manufacturing firms." *Macroeconomics and Finance in Emerging Market Economies*; Routledge. [Manuscript ID: REME-2011-0029]

Reviewer, "Financial Performance and Ownership Structure of Ethiopian Commercial Banks." *Journal of Economics and International Finance*. Academic Journals. [Manuscript Number: JEIF-11-036]

Reviewer, "Asset Sales by Manufacturing Firms in India". J*ournal of Quantitative Economics*. The Journal of The Indian Econometric Society.

Reviewer, Heterogeneity in the price setting behavior, spatial disparities and Sectoral Diversity: Evidence from a Panel of Italian firms." *Economic Modelling*. Elsevier. [Ms. Ref. No.: ECMODE-D-11-00086]

George, S. K.
Reviewed papers for the *Journal of Indian Council of Philosophical Research*, 2010-11.

Jung, P.G.
Reviewed for *Economic and Political Weekly*, November 2011. Review Published as Emotion Cultures and the Culture of Emotions, in *Economic & Political Weekly* Vol: xlvi : 47, November 2011, pp. 31-32.

Served as Guest Editor for a Special Issue on Self and Other in the *Journal of Indian Council of Philosophical Research*, Vol. 28: 4, December, 2011.

Kulkarni, Malhar
Member of the Regulating Council of the Bhandarkar Oriental Research Institute, Pune.

Member, Examination Council, Vedashastrottejaka Sabha, Pune.

Member of the Steering Committee, International Sanskrit Computational Linguistics Symposium.

Invited as Senate Member, Expert Committee for evolving Script Grammar for Sanskrit, Ministry of MCIT, Govt. of India.

Narayanan, K.
Member, Project Evaluation Committee, Ministry of Environment and Forest, Government of India.

Member of the Working Group on "Boosting India's Manufacturing Exports" for the *12th Five Year Plan*, for the Ministry of Commerce & Industry Department of Commerce

Reviewer, Industry and Innovations, an international journal.

Reviewer, NMIMS Management Review.

Examiner of M.Phil and Ph.D theses from Tata Institute of Social Sciences, and Ph.D thesis from Kolkata University, University of Delhi, Jawahar Lal Nehru University, Sri Sathya Sai Institute of Higher Learning, Mumbai University, Tamil Nadu Agricultural University, and IIT Madras.

Nath, R.
Reviewed papers for *Philosophical Papers and Reviews* 2012, published by Academic Journals

Reviewed Papers for *Philosophy Study* 2012-2013, published by David Publishing, USA.

Parthasarathy, D.
Reviewed papers for *Sociological Bulletin, and Natural Hazards*; Reviewed Research Proposals for *Austrian Climate Research Program*

Member, Board of Examiners for Central University of Bihar

Ramanathan, A.
Visitor's Nominee. Have been invited to be the Visitor's Nominee for faculty selection at Central University of Rajasthan

Invited Senator. Senate member of Indian Institute of Technology-Gandhi Nagar

Ramasubramanian, K.
Reviewed papers for *Indian Journal of History of Science*

Reviewed papers for *Ganita Bharati*

Robinson, R.
Managing Editor, Indian Anthropologist – Journal of the Indian Anthropological Association) (Appointed 2012)

Sebastian, C.D.
Editor, Journal of Sacred Scriptures (ISSN 0974-0090).

Faculty Members and their Specialisations

Economics

1. A. Ramanathan
Managerial Economics, Applied Econometrics, Monetary Economics.

2. P.L. Trivedi
Open Economy Macroeconomics, International Trade and Finance, Indian Economy, Environmental Economics.

3. K. Narayanan
Industrial Economics, Multinationals and Technology Transfer, Industry-Environment Linkages, International Trade, and Socio Economic Impacts of Climate Change.

4. Haripriya G.S.
Development economics, environmental economics, climate change, Green Accounting

5. Puja Padhi
Financial Economics, Monetary Economics

6. 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
Creativity and Creative Writing discourses, Science as a Cultural Construct in Literary/Performative Genres with special focus on Science-Drama.

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. Paulomi Chakraborty
Partition Literature, South Asian Fiction in English, Women's Studies

Philosophy

1. P.R. Bhat
Philosophy of Language, Contemporary Western Philosophy, Meta-Ethics.

2. C.D. Sebastian
Indian Philosophy

3. Vikram Singh Sirola
Analytic Philosophy, Contemporary Western Philosophy

4. Ranjan K. Panda
Philosophy of Mind, Analytic Philosophy

5. Ratikanta Panda
Analytic Philosophy, Philosophy of Language and Contemporary Indian Philosophy

6. Siby K. George
Twentieth Century Continental Philosophy

7. Rajakishore Nath
Philosophy of Artificial Intelligence, Philosophy of Mind, Cognitive Science

8. Jung P.G.
Wittgenstein, Alfred Korzybski, Philosophy and Popular Culture, Ethics.

Psychology

1. Meenakshi Gupta
Social Psychology, Organizational Behaviour, Human Resource Development

2. T. Bhattacharya
Health and Clinical Psychology, Psychosomatic disorders, Stress & Coping, subjective well-being, ergonomics, cross-cultural personality

3. Pooja Purang
Organizational Psychology, Organizational Behavior, Human resource management, personality.

4. Azizuddin Khan
Cognitive Psychology, Clinical Psychology, Neuro Psychology, Ergonomics, Event Related Potential

5. Mrinmoyi 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
Sociology of religion, kinship and family; Indian society

3. D.Parthasarathy
Development Studies, Law and Governance, Urban Studies, Vulnerability and Adaptation to Climate Change, Women and Gender Studies, Research Ethics

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, sustainable development and climate change ethics.

6. Ramesh Bairy
Social Stratification; Contemporary Caste; Religious Institution

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
Indian Mathematics and Astronomy, Metaphysics and Advaita Vedanta Non-linear Dynamics and Chaos

Mathematics

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 organisations; and extended educational activities beyond the departmental academic programmes. IIT Bombay and TIFR Mumbai signed an MOU on National Center for Mathematics (NCM). The current faculty strength is 40. The new faculty members who joined the department are: Raghunathan, M.S. (Distinguished Professor), and Niranjan Balachandran (Assistant Professor).

Academic Programs

Degrees Awarded	
Ph.D.	: 11
M.Sc.(MA)	: 27
M.Sc. (ASI)	: 30
M.Phil.	: 01

Besides the teaching of B. Tech. courses, the department offers M.Sc. and Ph.D. programmes. It has two distinct M.Sc. Programmes (M.Sc. in Mathematics and M.Sc. in Applied Statistics and Informatics) and 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 the 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/organisations 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), Aberystwyth University (UK),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, University of Twente, Netherlands 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. The department organized an Advanced Instructional School in Group Theory.

Sponsored Research Projects

Sponsored Projects	**: 8**
Ongoing	: 6
New	: 1
Completed	: 1
Faculty Involved	**: 7**

Project Title	Sponsoring Agency	Status (New/Ongoing/ Complete
"National Programme on Differential Equations: Theory, Computation and Applications (NPDE-TCA)"	DST	Ongoing
"The Oldroyed Model of Viscoelastic Fluids: Theoretical and Computational Issues"	DST	Ongoing
"Theoretical and Computational Studies of Kelvin Voigt model of viscoelastic fluids"	DST –CNPq (Indo-Brazil)	Completed in Feb., 2012
"Numerical Treatment of Integral Operators with Non-smooth Kernels"	Indo-French Cent (L. Grammont)	Ongoing
"Liftings of operator tuples and structure theory of operator algebras"	IRCC seed grant	Ongoing
"Robust parameter designs for quality and safety critical processes"	DST	New (SM)
"Identifying the most successful combination dose in a phase I/II clinical trial"	IRCC	Ongoing (SM)
"Selection of Risk Factors Affecting Osteoporosis"	IRCC	Ongoing (SM)

Conference/Workshops/Seminars (Participated/ Paper Presented)

Deshpande, Jayant V.
National Seminar on Reliability Theory at ISI, Kolkata, November 2011.

Indian Science Congress, Bhubaneswar, January, 2012

National Seminar on Adnvances and Applications of Statistics, Panjab University Chandigarh, February, 2012

Dey Santanu
Conference on Analysis, 23-25 December, 2011 at ISI Delhi

Ghorpade, Sudhir R.
ATM Workshop on Representation Theory of Finite Groups of Lie type: Deligne-Lusztig Theory, during December 5-10, 2011, at the Tata Institute of Fundamental Research, Mumbai.

Four lectures on "Normalization and Primary Decomposition'', *NBHM Advanced Instuctional School on Computational Commutative Algebra*, during January 19-22, 2012, at NIIT University, Neemrana, Rajasthan.

Neela Nataraj
Oberwolfach Workshop on *Advanced Computational Engineering* during February 12-8, 2012

Pani, Amiya Kumar
DST Expert Committee Meeting on the National Programme on *Differential Equations: Theory, Computation and Applications* during April 14-15, 2011.

Workshop on *Adaptive Finite Element Methods* during March 16 - 25, 2012 held in IIST, Trivandrum

Ranjan Akhil
ATM Workshop on Geometry and Topology as a resource person at NEHU Shillong, June 2011.

Ravi Raghunathan
"On the Exterior square L-function of GL(n)", Lie Group Session, *26th Annual Conference of the Ramanujan Mathematical Society*, University of Allahabad, October 2-5, 2011

"Factorisation of Automorphic *L*-functions in the Selberg class", *International Meeting in Number Theory* (in honour of Professor R. Balasubramanian), Harish-Chandra Research Institute, Allahabad, December 15-2, 2011

International Colloquium on *Automorphic Representations and L-functions*, TIFR, Mumbai, January 3-11, 2012

International Conference on the Cohomology of Arithmetic Groups, TIFR, Mumbai, December 28-31, 2011

Sabnis, S.V.
"Economic Component Level Reliability Test Plan for a Parallel System using Exact Expression for System Reliability" in an *International Conference on Quality, Reliability and Information Technology* held at Kathmandu during December 7-9, 2012

Sharma, V.D.
Presided over the Inaugural Session and delivered a plenary lecture on "Hyperbolic PDEs" at a *National Conference on Mathematical Modeling and Computer Simulation,* organized by the Department of Applied Mathematics, Institute of Technology, Banaras Hindu University during April, 2011.

"Nonlinear Hyperbolic Waves and Riemann Problem in Gasdynamics" in the *39th Summer School on Advanced Problems in Mechanics* organized by the Institute for Problems in Mechanical Engineering at Saint-Petersburg, Russia during July, 2011

Vellaisamy, P.
"Average Collapsibility of Distribution Dependence and Quantile Regression Coefficients" in *XXXI Annual Conference of ISPS and International Conference on Statistics, Probability and Related Areas,* organized by the Department of Statistics, CUSAT (Cochin), held December 19-22, 2011

"New Developments in Theory and Applications of Statistics", in the *International Conference,* organized by METU, Ankara (Turkey) held during May 2–4, 2011

Verma, J. K.
"Measures to be taken for Development of Mathematical Sciences" in Uttarakhand, *6th Uttarkhand State Science and Technology Congress-2011*, November 14-16, 2011, Kumaun University, S.S.J. Campus, Almora.

"Local Cohomology of Rees Algebras, Complete Ideals and a Theorem of Rees", *National Symposium on Mathematics*, Lucknow University, February 2-4, 2012

"Grobner Bases and Solutions of Polynomial Equations", *26th Annual Meeting of Ramanujan Mathematrical Society*, Allahabad University, October 2-5, 2011

"Eigenvalues of Commuting Operators and Solutions of Polynomial Equations", *6th Uttarkhand State Science and Technology Congress-2011*, November 14-16, 2011, Kumaun University, S.S.J. Campus, Almora.

Workshops and Conferences: (Organised / Coordinated)

Anandavardhanan, U.K.
School on Alebra, Analyssis & Toplogy, September 1-7, 2011, Kerala School of Mathematics, Calicut.

Sane, Sharad S.
NBHM Advanced Instructional School in Algebraic Graph Theory at the Department of Mathematics, University of Pune in December, 2011; Coordinator of the School and also gave six lectures on "Algebraic Graph Theory".

Sharma, V.D.
Member of the Organizing Committee of *Advanced Instructional School in Mechanics* (Sponsored by NBHM), December, 2011, conducted at the University of Hyderabad.

Shastri, A.R.
An Advanced Instructuctional School in Algebraic Topology, Coordinator, jointly with H. Mukherjee, sponsored by NBHM. (Gave 8 lectures and conducted several hours of Tutorials) June 13 - July 2, 2011, NEHU Shillong.

An Advanced Training in Mathematics for Lecturers in Calculus and Differential Geometry, academtic Coordinator, gave 6 lectures and conducted several hours of Tutorials. November 27 - December 10, 2011, at ISI Kolkatta.

Organised an *International Workshop on Geometry and Topology*, sponsored by NBHM, gave 6 hours of lectures and conducted some tutorial sessions. February 17 – 28, 2012, Department of Mathematics, IIT Bombay.

Verma, J.K.
Workshop in Algebra and Number Theory, 22-24 March, 2012, Kumaun University, Almora, Uttarakhand.

Workshop on Computational Commutative Algebra and Algebraic Geometry, January 16-28, 2012, NIIT University, Neemrana, Rajasthan.

Conference on Commutative Algebra and Algebraic Geometry-2012, March 5-9, 2012, University of Pondicherry

ATM Workshop on Commutative Algebra, IIT Bombay, July 1-12, 2011

Pani, Amiya Kumar
Indo-UK Symposium on Recent Advances in Industrial &Applied Mathematics in IIT Bombay during November 5-6, 2011.

Neela Nataraj
Member of the Advisory Committee of *Workshop on Adaptive Finite Element Methods* held in IIST, Thiruvananthapuram from March 16-25, 2012. Have delivered lecture series in the workshop.

Organised a *Mini-Symposium* on *C^0 Interior Penalty Methods for Higher Order Partial Differential Equations* and gave a talk entitled "An Interior Penalty Method for Fourth Order Problems " in the *7th International Congress on Industrial and Applied Mathematics (ICIAM 2011)* held in Vancouver, July 2011

Niranjan Balachandran
Research Promotion Worshop on Graph and Geometric Algorithms, March 14-16, 2012, DA-IICT, Gandhinagar.

Conference on Analysis, December 23-25, 2011, ISI Delhi.

Invited Lectures

Anandavardhanan, U.K.
Five lectures on "Rings and Modules", School on Algebra, Analysis & Topology, Kerala School of Mathematics, Calicut, September 01-07, 2011.

Four lectures on "Distinguished Representations: Local and Global Aspects", *2011 Number Theory Program*, Morningside Center of Mathematics, Chinese Academy of Sciences, Beijing, May 21 - June 3, 2011

2011 Number Theory Program, Morningside Center of Mathematics, Chinese Academy of Sciences, Beijing, May 21 - June 03, 2011.

Dey, Santanu
"Generalized Repeated Interaction Model and Transfer Functions" on July 13, 2011 at Aberystwyth University, UK

Ghorpade, Sudhir R.
"Inspiring Episodes from the Theory of Equations", *DST INSPIRE Science Camp*, M. S. University of Baroda, Vadodara, July 29, 2011

"Glimpses of Greatness: Ramanujan and the Theory of Partitions", *DST INSPIRE Science Camp*, M. S. University of Baroda, Vadodara, July 30, 2011

"Measure and Integral", University of Pune, Pune, September 17, 2011

"Solving Polynomial Equations: a Journey through Renaissance", *Colloquium talk*, UM-DAE Centre for Excellence in Basic Sciences, Mumbai, October 18, 2011

"An initiation into Additive Theory of Numbers", *DST INSPIRE Science Camp*, Loyola Degree College, Pulivendula, A.P., November 26, 2011

"Partitions of Numbers and a Remarkable Formula of Ramanujan", *DST INSPIRE Science Camp*, Sri Venkateswara University, Tirupati, A.P., December 11, 2011

"Glimpses of the Development of Algebra'', Dayalbagh Educational Institute, Agra, February 6, 2012

"Solving Quadratic Equations and Beyond"', *DST INSPIRE Science Camp*, Loyola Degree College, Pulivendula, A.P., February 22, 2012

"Estimates for the Number of Solutions of Equations over Finite Fields'', *Number Theory Seminar*, Brigham Young University, Provo, Utah, USA, May 3, 2011.

"Linear Codes, Classical Varieties and Enumerative Combinatorics", *CVC/ICSE Seminar*, University of Texas, Austin, USA, May 9, 2011.

"Determinantal Varieties and their Jet Schemes", University of Manitoba, Winnipeg, Canada, May 19, 2011.

Two lectures on "Arithmetical Functions'', *Two Day Lecture Series on Number Theory*, on September 4, 2011 at the Sardar Vallabhbhai National Institute of Technology, Surat.

Two lectures on "Finite Fields and their Applications", *Karnataka Science & Technology Academy Special Lecture Series*, on October 18, 2011, at Mangalore University, Mangalagangothri.

Six lectures on "Algebra'', *NBHM Annual Foundational School (AFS-I),* during December 13-17, 2011 at the Indian Institute of Science Education and Research, Pune.

"Splitting Subspaces over Finite Fields'', *National Conference on Recent Advances in Mathematics*, held during February 2–4, 2012 at Lucknow University, Lucknow.

"Coprime polynomial pairs, Hankel Matrices, and Splitting Subspaces'', in the Session on Finite Fields in Combinatorics at the *3rd Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM-2011),* held during May 31-June 3, 2012, at the University of Victoria, Victoria, BC, Canada.

"Hilbert Series of Jet Schemes of Determinantal Varieties'', *International Conference on Commutative Algebra and Algebraic Geometry* (CAAG - 2012), held during March 5-9, 2012, at Pondicherry University, Puducherry.

Joshi R.R.
"Neural Network-based Datamining to Predict Protein-Protein Binding and Functions", *National Workshop on Proteins to Proteomics,* organised by DST and BIC. September, 2011, Pune

"My contributions in Statistical Data Mining Applications in Immuno-informatics" at joint meeting of Professors from Harvard University and Centre of Excellence in Bioinformacits, at Pune Univ. Campus, Pune, February, 2012.

Lecture-series on "Advanced Applications of Neural Networks in Protein Structure -Function Modeling", Centre of Excellence in Bioinformacits, at Pune University, Pune. February, 2012.

Limaye, B.V.
"Fundamental Theorem of Calculus for Rectangles and Cuboids" on August 20, 2011, North Maharashtra University, Jalgaon.

Valedictory address in the *Seminar on Challenges in Mathematics Education* at N.C. Acharya & D.K. Marathe College of Atrs, Science and Commerce on September 17, 2011

"Some Questions about Prime Numbers" at Vignan University, Guntur, A.P. on January 27, 2012

Neela Nataraj
Lectures series on "Elliptic partial differential equations" in a *Workshop on PDE* under Science Academies' *Lecture Programme* held at the S V National Institute of Technology, Surat, March 2012.

Niranjan Balachandran
"Storing Small Sets Efficiently in the Bit Probe Model with 2 Adaptive Probes", February 24, 2012, ISI Kolkata,

"Forbidden Configurations and Steiner designs", February 29, 2012, ISI Delhi.

"Graph Colorings", *Research Promotion Workshop on Graph and Geometric Algorithms.* March 15, 2012, DA-IICT.

Pani, Amiya Kumar
Colloquium talk entitled OnIndustrial Mathematics with a Case Study from Finance on March 21, 2012 in IIST, Trivandrum.

Colloquium talk entitled "Scientific Computing: A New Way of Looking at Mathematics in IISER", Trivandrum on March 22,2012

Two talks on "Optimal Control of Elliptic PDEs" in the *Workshop on Variational Analysis and Optimization with Applications to PDEs* during April 1-4, 2012

IRCC paper Award talk entitled "An Alternate Mixed Method: Old Wine in a New Bottle"

A series of Lectures (18 hours) on "Fixed Point Methods and Applications to PDEs", in the *International Workshop on Fixed Point Theory and Applications to PDEs,* Department of Mathematics, Chiangmai University, Chiangmai (Thailand), during December 27-29, 2011

A series of two lectures on "Discontinuous Galerkin Methods" in the *International Workshop on Numerical Methods for PDE: Analysis and Applications,* held in the Sultan Quaboos University, Oman during January 10-11, 2012

"Adaptive Finite Element Method for Valuation of Multi-Asset American Option" in the *International Conference on Mathematical Modeling in Industry* November 30 - December 2, 2011

Invited talk entitled "Discontinous Galerkin Methods for Elliptic Problems: Old Wine in a New Bottle" in the *International Conference on Nonlinear Functional Analysis* during January 18-20, 2012

Ravi Raghunathan
"On the Exterior Square *L*-function of GL(n)", Indian IISER Pune, March 30, 2012

"On the Local and Global Exterior Square *L*-functions of GL(n)", Tata Institute of Fundamental Research, Mumbai, March 21, 2012

"On the Vanishing of *L*-functions of Weight 2 Cusp Forms at the Centre of the Critical Strip", Institute of Mathematical Sciences, Chennai, February 1, 2012

"Number Theory" (two lectures), *Lecture series in Number Theory*, NIIT Surat, September 4, 2011

"Number Theory Year", Institute of Mathematical Sciences, January 15 - February 2, 2012

Sabnis, S.V.
"An Overview of Construction of Reliability Test Plans", March 14, 2012, BARC

Two talks, on "Applications of Statistics to Electronic Industry", *Workshop on Research Methodology for Electronic Engineers,* was held at G H Patel College of Engineering & Technology, Vallabh Vidyanagar, during October 17-19, 2011.

Sane, Sharad S.
"Strongly Regular Graphs", Conference on *Combinatorial Matrix Theory* at Manipal Institute of Technology, Manipal,

Sharma, V.D.
"Quasilinear PDEs" in *National Conference on Towards Excellence in Science* held at the Institute of Science, Mumbai, January 2012.

"On weakly nonlinear hyperbolic waves" in the *National Conference on Mathematical Sciences* held at the School of Mathematical Sciences, North Maharashtra University during March 2012.

Fellowship Award Lecture entitled "Asymptotic Waves in Compressible Flows" at the International Academy of Physical Sciences, Allahabad held at NIT Surat during December 2011.

"Sir G.I. Taylor Memorial Lecture" in the *56th Congress of the Indian Society of Theoretical and Applied Mechanics (ISTAM)* held at NIT Surat during December, 2011

Plenary lecture entitled "Resonantly Interacting Waves and Kinematics of a Shock" in the *6th International Conference on Dynamical Systems and Applications* held under the auspices of International Federation for Nonlinear Analysts and Clark Atlanta University – Center for Theoretical Studies of Physical Sciences at Morehouse College – Division of Science and Mathematics, Atlanta, Georgia, USA, May, 2011

Verma, J. K.
"Solving Polynomial Equations", 3 lectures, *Miniworkshop on Algebra and Number Theory*, Kumaun University, Almora, March 22-24, 2012.

"Cohen-Macaulay Rings", 4 lectures, *Workshop on Computational Methods in Commutative Algebra and Algebraic Geometry*, NIIT University, Neemrana, January16-28, 2012.

"Invariants of Finite Groups", 6 lectures, *Advanced Instructional School on Invariant Theory,* Chennai Mathematical Institute, Chennai, December 12-30, 2011.

Significant Awards and Distinctions

Joshi, R.R.
Member, National Task Force in Bioinforamtics, Computational Biology and Systems Biology.

Pani, Amiya Kumar
Elected Fellow of Indian Academy of Sciences (FASc), 2012

Elected as a Fellow of Indian Academy of Sciences (FAS), Bangalore

IRCC Research Award-2010

Institute Chair Professor for a period of three years starting from April, 2011

Visiting Professor, Federal University of Parana, Curitiba (Brazil) during Nov-Dec, 2011

Visiting Professor, Chiangmai University, Chiangmai (Thailand) during Dec, 2011 - 8th January, 2012

Awarded IRCC Research Paper Award for the Year 2011

Sabnis S.V.
Excellence in Teaching Award-2011, IIT Bombay

Awarded the IIT Bombay Excellence in Teaching Award for the year 2011.

Sharma V.D.
Fellowship of the International Academy of Physical Sciences (Allahabad University), in recognition of his contributions to Mathematics

Chair of the National Committee of the International Union of Theoretical and Applied Mechanics (IUTAM) for a period of four years with effect from January 2012.

Elected as a Fellow of the International Academy of Physical Sciences, Allahabad.

Raghunathan M.S.
Awarded 'Padma Bhushan'

Srinivasan, G.K.
Excellence in Teaching Award 2011, IIT Bombay

Honorary Work

Ameer Athavale
Reviewed two papers for *Mathematical Reviews*.

Anandavardhanan, U.K.
Served as Reviewer for *Mathematical Review* and *Zentralblatt MATH.*

Ghorpade, Sudhir R.
Served as Member, Council of Editors, *Resonance* (up to December 2011).

Served as Member, Editorial Board, *International Journal of Information and Coding Theory.*

Served as Referee for international journals.

Joshi, R.R.
Served as reviewer for international journals.

Kulkarni, Rekha P.
Refereed papers for international journals

Limaye, B.V.
Served as Referee of a research paper for an international journal.

Mukhopadhyay, Siuli
Reviewed papers for international journals.

Neela Nataraj
Served as Reviewer for international journals.

Pani, Amiya Kumar
Served as Reviewer for several international journals.

Served as Reviewer for several National and International projects.

Ravi Raghunathan
Served as Reviewer for *Mathematical Reviews*.

Sabnis, S.V.
Referred one research article for national journal.

Sharma, V.D.
Reviewed papers for *Math Reviews* and *Zentralblatt MATH*.

Verma, J.K.
Reviewer for *Mathematical Reviews*.

Visitors to the Department

Alexei Stepanov, University Of Illinois, At Urbana-Champaign, "Two lectures on Chevalley groups over rings: universal localisation and Multiple Relative Commutator formula"

Balasubramanian, K. ISI, New Delhi, "A series of 2 lectures on "On the Evaluation of Certain Permanants: A New Approach and Some Isomorphic Vector Spaces and their Applications to Probability Distributions"

Bharath Sethuraman, California State University, Northridge, USA, Spring 2011

Brown A.L., University College London, "Metric Projections in Spaces of Continuous Functions"

Cassio Oishi, Universidade Estadual de Sao Paulo, Brazil

Carsten Carstensen, Humboldt Univ, Berlin.

Chandrajit Bajaj, University of Texas at Austin, USA, "Dual Finite Elements and Discrete Hodge Stars"

Clare D'Cruz, Chennai, Mathematical Institute, "Castelnuovo Mumford regularity of powers, sum and radical of ideals."

Dhiman Bhadra, Dept of Mathematical Sciences, Worcester Polytechnic Institute, USA
Lecture on "A Bayesian Semi-parametric Approach for Incorporating Longitudinal Information on Exposure History for Inference in Case-Control Studies"

Farrell F. T., SUNY Binghamton New York USA, "A series of 2 lectures on Smale's h-Cobordism Theorem and Deduction of Poncare Conjecture in dimension greater than or equal to 6 and Topological Rigidity"

Francesco Mainardi, Dept. of Physics, Univ. of Bologna, and INFN, "Completely monotone and Bernstein functions for linear viscoelastic and dielectric materials"

George Exner, Bucknell University, USA, A series of 2 lectures on "n-contractivity and k-hyponormality"

Gilles Lachaud, Institut de Mathematiques de Luminy, Marseille, France, "Word oriented LFSR and construction of block Frobenius matrices in a given conjugacy class"

Gorenflo R., Free University, Berlin, "Continuous Time Random Walk and Subordination in Space-time Fractional Diffusion"

Henryk Iwaniec (Rutgers), "Weyl's sums for roots of quadratic congruences."

Isha Dewan, Indian Statistical Institute, New Delhi, "Modeling opportunistic maintenance and repair as competing risks"

Jean-Marc Deshouillers, Institut de Mathématiques de Bordeaux, France, January 23-25, 2012

Kartik Prasanna, University of Michigan, Ann Arbor, "Periods of quaternionic Shimura varieties"

Laurence Grammont La Muse, University of Lyon, France, "F A new Nystrom method to treat a nonlinear integral equation of the second kind"

Madhava Rao K.S., Dept. of Statistics, Univ. of Botswana, Private Bag 00705, Gaborone,
"A simple nonparametric test for testing treatment versus control"

Madhuchhanda Bhattacharjee, Department of Statistics, University of Pune, India, "Integrated Modelling and Inference for Heterogeneous Data"

Mahuya Datta, Indian Statistical Institute, Kolkata, August 31 -September 4, 2011

Mahuya Datta, Indian Statistical Institute, Kolkata, "Universal property of the Chern character form of the universal connection"

Manoj Kummini, Chennai Mathematical Institute, "Boij-Soederberg Theory for Free Resolutions."

Marc-Hubert Nicole, Institut de Mathématiques de Luminy, "Generalized Hasse Invariants"

Mario Ahues, Professor Laurence Grammont, La MUSE, Jean Monnnet University, Saint Etienne, France. Period of visit: 20th June to 1st July 2011

Mario Ahues La Muse, University of Lyon, France, "For nonlinear infinite dimensional equations, which to begin with: linearization or discretization?"

Mrinal Kanti Roychowdhury, The University of Texas-Pan American, USA, "Optimal points for a probability distribution on a Cantor set"

Mythily Ramaswamy, I.I.Sc. Bangalore, "Control of Differential Equations"

Neeraj Misra, Department of Mathematics, IIT Kanpur, "Optimal Redundancy Allocations in Systems and Comparison of Component and System Level Redundances"

Pedro Damazio and Jinyun Youn, UPFR, Curitiba, Brazil.

Ram C. Tiwari, Associate Director, Office of Biostatistics, Center for Drug Evaluation and Research, FDA, USA, "Likelihood ratio test based method for signal detection with application to FDA's drug safety data"

Sagun Chanillo, Rutgers University, "Embedding Cauchy-Riemann manifolds and the Yamabe invariant"

Simha R. R. (retired), School of Maths T.I.F.R., "Bishop's Lemma on Analytic Polyhedrons"

Shreeram S. Abhyankar Purdue University, West Lafayette, USA, January 2, 2012.

Somesh Kumar, Department of Mathematics, IIT Kharagpur, "Estimation of the Measures of the Reliability"

Sreekar Vadlamani, TIFR-CAM, Bangalore, "Infinite dimentional integral geometry and its application in random fields".

Srikanth Srinivasan, IAS Princeton, "The Hardness of the Noncommutative Determinant"

Tariq Rizvi, S., Dept. of Mathematics, The Ohio State University Lima, Ohio, U. S. A.,
"Theory of Baer Modules- Some Recent Developments"

Upendra Kulkarni, I.I.Sc. Bangalore "Representations of the general linear and symmetric groups"

Vidar Thomee, Chalmers Univ and Tech., Chalmers, Sweden.

Viji Thomas, TIFR Bombay, "Two Lectures on Rings of Weak Global Dimension at Most 1 and Prufer Domains, and A journey from Gauss's lemma to Prufer domains to Gaussian rings."

Vikram Aithal, Center of Excellence in Basic Sciences (UM-DAE), "Two lectures on Several complex variables and Hartog's Phenomenon"

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. **Debraj Chakraborty**
   Several Complex Variables

5. **Das, Ashish**
   Design of Experiments

6. **Dey, Santanu**
   Operator Algebras

7. **Garge, Shripad M.**
   Number Theory, Linear Algebraic Groups

8. **Ghorpade, Sudhir R.**
   Algebraic Geometry, Combinatorics

9. **Joshi, Kapil D**.
   Topology, Discrete Mathematics

10. **Joshi, Rajani R**.
    Computational Biology, Biostatistics and Bioinformatics

11. **Kaipa, Krishna**
    Complex Analysis

12. **Keshari, Manoj Kumar**
    Commutative Algebra (Projective modules)

13. **Kulkarni, Rekha P**.
    Numerical Functional Analysis, Spline Theory

14. **Kulkarni, Ravi S. (Institute Chair Professor)**
    Differential Geometry

15. **Mahajan, Swapneel**
    Geometry and Topology

16. **Mukhopadhyay, Siuli**
Statistics

17. **Nataraj, Neela**
Finite Element Methods

18. **Niranjan Balachandran**
Combinatorics

19. **Pani, Amiya K. (Institute Chair Professor)**
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. (Institute Chair Professor)**
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. **Sureshkumar, K**.
Stochastic Differential Game Theory, Mathematical Finance.

34. **Vellaisamy, P**.
Statistics and Probability

35. **Verma, Jugal K.**
Commutative Algebra

Professor Emeritus

36. **Pai, Devidas V**.
Functional Analysis, Approximation Theory, Set-valued Analysis

Emeritus Fellow

37. **Limaye, Balmohan V**.
Functional Analysis, Approximation Theory, Set-valued Analysis

Visiting Faculty

38. **Jayant V. Deshpande** (Visiting Faculty [Professor])
Probability and Statistics

39. **Sharad S. Sane** (Visiting Faculty [Professor])
Combinatorics and Design Theory

Distinguished Professor

40. **M. S. Raghunathan**
Lie Groups

41. **Tarlok Nath Shorey**
Theory of Numbers

Distinguished Visiting Professor

42. **Carsten Carstensen**

Mechanical Engineering

Introduction

The Department of Mechanical Engineering at IIT Bombay consists of 42 faculty members and over 600 students. The department offers academic programmes leading to B.Tech., Dual Degree (B.Tech & M.Tech.), M.Tech. and Ph.D. degrees. The faculty members are grouped under three broad specializations – Thermal & Fluids Engineering, Design Engineering and Manufacturing Engineering. The academic activities are supported by 20 laboratories. The department focuses its major research efforts in the following areas: Computational Mechanics, Nuclear Reactor Thermal Hydraulics, Computer Integrated Manufacturing, Refrigeration, Airconditioning Heat Pumps and Cryogenics, MEMS, NEMS Mechatronics, Microchannel Flows and Microstructural Mechanics.

The department constantly strives to improve its achievements both in manpower training and research, and resets its goals keeping in view the current national needs. This is evident from the research publications in international refereed journals and patents filed by the faculty and students. Our faculty members are well recognized in their fields and have won many distinguished awards from professional bodies worldwide. A new M.Tech. specialization in Nuclear Engineering was introduced in 2011 keeping in view the growing interest in Nuclear Energy.

The students of the department organized their annual event, "Radiance 2012" on 4th March, 2012, under the banner of Mechanical Engineering Association. Several competitions and workshops were held and students from several outstation colleges participated in the activities. Invited lectures by well-known personalities were also arranged.

Academic Programmes

At the M.Tech level, there are four specialisations, viz., Thermal and Fluids Engineering, Design Engineering, Manufacturing Engineering, and Nuclear Engineering, and at the Dual-Degree level, there are three specialisations viz., Computer-Aided Design and Automation, Computer-Integrated Manufacturing, and Thermal and Fluids Engineering.

Students admitted in 2011		
B.Tech.	:	94
Dual Degree	:	45
CADA-23; CIM - 22; TFE-Nil		
M.Tech.	:	97
Ph.D.	:	34
Students passed out (48th Convocation)		
B.Tech.	:	48
Dual Degree	:	48
CADA-17; CIM - 14; TFE-17		
M.Tech.	:	86
Ph.D.	:	5

R & D Activities

The faculty members of the department are actively involved in sponsored research from governmental and private organizations with over 20 crores research grants per annum. Some of the important governmental agencies sponsoring research include DAE, ARDB, ISRO, DRDO, AERB, DIT, DST, BARC MHRD, BRNS, NRB, CSIR and ONGC. Some of the prominent private organizations sponsoring research in the department include General Motors, Boeing, Godrej, Tata Motors, Applied Materials, L&T, etc. Apart from sponsored research, the department is also involved in industrial consultancy and continuing education programmes (CEP). The National Center for Aerospace Innovation and Research (NCAIR) is housed in the department which aims to develop an advanced aerospace manufacturing eco-system in India. The department

has licensed several technologies, such as Solar Steam Generators and Multi-utility heat pumps, etc., to private institutions.

Research and Development Facilities

Several facilities and sensitive instruments are available with the department to pursue state-of-the-art fundamental and applied research. Some of these are PIV, Micro-PIV, Rarefied Gas Facility, PDMS Microchannel Fabrication Facility, Scaled Model of AHWR, Critical Heat Flux Test Facility, Micro-stereo Lithography Facility, Electronic Speckle pattern interferometer, micro system analyser (laser Doppler vibrometery, stroboscopic microscopy, white light interferometry), Helmel 5–axis CNC Machining Centre, Hardinge Vertical Machining Center, EMCO Precision CNC Lathe, Mikrotools CNC Multi-purpose Micromachining Center, Excimer Laser Micromachining Facility and Fibre Laser 100W for micromachining and forming.

Recently Executed Research Projects

- Development of computational model for large water cooled nuclear reactors and analysis of transients using the model developed.
- Stability studies in a scaled model of Advanced Heavy Water Reactor
- Analysis of compressible flow phenomena including shock-structure interactions, hypersonic flow over re-entry vehicles,
- Development of novel cooling solutions for the next generation high heat flux processors using traditional approaches, micro-channel heat sinks and synthetic-jets.
- Investigation of kerosene-based nano-fluid for internal convective heat transfer enhancement.
- Two phase flow and heat transfer analysis of nuclear reactor channels following a severe accident.
- Simulation of Flows with Interfaces.
- Heat Transfer enhancement in rotating pipes with various types of inserts.
- Investigations in fire dynamics.
- Jet impingement heat transfer.
- Flow metering.
- Melting and Solidification of low and high Pr fluids.
- Welding Science and Technology, Process Modelling.
- Particle based simulation of fluids and plasmas.
- Generation of particles in IC Engines and plasma based methods and using particles to develop novel fluids.
- MEMS, Mechatronics, Micro-stereo-lithography, Nonlinear control Crack propagation through elastic plastic materials.
- Dynamic fracture and component health monitoring.
- Development of modular rotating-hinge total knee prosthesis.
- Development of three dimensional visualization and surgery planning software.
- Advance Characterization of Wrought Magnesium Alloys through Electron Diffraction and Microscopy Techniques
- The role of Pre-Form Strain (PFS) and Short Burst Annealing (SBA) on the hardening/softening and formability characteristics of automotive sheet alloys
- Liquid Desiccant based Air Conditioning
- Plastic Air to Air Heat Exchangers
- WebCNC - Internet Based Virtual CNC Laboratory
- Network enabled medical diagnosis and education using x-rays (CollabRAD)
- Network enabled online casting solidification simulation (E-Foundry)
- Development of 20 K Two stage Pulse Tube Refrigerator
- Development of 2 stage Srirling Cryocooler

Sponsored Research Projects	**:**	**67**
New	:	27
Ongoing	:	26
Completed	:	14
Faculty Involved	**:**	**31**

Twenty four new projects were undertaken with a sanctioned outlay of Rs. 8,12,10,538, with approximately 31 involved faculty.

Project Title	Sponsoring Agency
Particle image velocimetry based measurements around cylinders in row and V configurations	NRB
Optimization of radiation transport containers under impact loading	BRNS
Development of a pilot-scale free-piston driven shock tube for high temperature gas dynamic studies	IRCC, IITB
Network Enabled Online Casting Simulation System (E-Foundry)	NIC, DIT

Project Title	Sponsoring Agency
Analysis of Containment Spray System Nozzle characterization and Spray effect on Containment environment post accident conditions	AERB
Separation Characteristics of Lubriclone	Eaton Technologies
Experimental and Numerical Investigations of Heat Transfer in Tube, Single Rod Annulus and Rod bundle geometries Using Supercritical Fluid Freon-22	AERB
Thermo-Mechanical Failure in CT Tubes under Severe Accident Conditions	AERB
Experimental study on the very high strain rate mechanical behavior of metal alloys	DRDO
Development of 15 K Three Stage High Frequency Pulse Tube Cryocooler	DST
Solar Plastic Tubular Air Heater	DST
Engineered Surfaces on Pyrolytic Carbon for Biomedical Applications	CSIR
HCCI mode of operation to reduce emissions in internal combustion engines: Experimental and numerical investigation	DST
Study of Gas Turbine Combustion and Emission Reduction Technologies using Advanced Models	ARDB
Design, Development And Testing Of Novel Vortex Flowmeters	DST
Ignition and Combustion Studies on Liquid Monopropellants for IC Engine Applications	DRDO
Computational Modeling and Simulation of Film-Condensation.	Asian office of Aerospace Research and Development, USA
Investigation on ratcheting and fatigue crack growth behavior of carbon steel pipes and stainless steel pipe	BRNS
An Experimental and Theoretical Investigation on Pulsed Current Gas Metal Arc Welding Process with Short Circuit Metal Transfer of Similar and Dissimilar Materials	DRDO
Measurement of heat transfer characteristics of ribbed rotating channels similar to those used in Gas Turbine cooling passages	DRDO
Technical Consultancy on Numerical Prediction of Temperature Field and Residual Stresses in Laser Deposited FGMs	DRDO
Identification of Welding Parameters for Target Weld Attribute using Process Simulation Models and Optimization Algorithms	DST
Old saree cutting Machine	DST
The role of Pre-Form Strain (PFS) and Short Burst Annealing (SBA) on the hardening/softening and formability characteristics of automotive sheet alloys	General Motors Technical Centre India Pvt. Ltd.

Project Title	Sponsoring Agency
Numerical & experimental investigation in slosh phenomenon under microgravity	ISRO
Dynamics and Control of Mechanical Systems	MHRD
Development and characterization of IPMC and other polymer actuators	NMRL
Ongoing Projects:	
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	BRNS
Enterprise Solutions	CARE
Development of a Direct Simulation Monte Caro (DSMC) code for high-speed high Knudsen number flows	ISRO
Optimal Design, Fabrication and Testing Electrostatic Micro-Actuators with Extended Travel Range	DST
Network Enabled Medical Diagnosis and Education in Skeletal Imaging using X-Rays	NIC, DIT
Carbon dioxide Capture and Conversion	WUStL
Numerical Investigations on Melting and Solidification of Low Prandtl number fluids	BARC
Investigations on Parallel Channel Instability and Steam Drum level Control Philosophy	BARC
Fracture and fatigue in nanocrystalline materials for MEMS/NEMS	DST
Design, Simulation and Testing of Micro Heat Exchanger for JT Cryocooler	BRNS
Investigation on Sorption Compress-or based J-T Cryocooler	BARC
Development of Free Displacer Stirling Power Generator	ISRO
Development of a Prototype Thermoacoustic prime Mover	BRNS
Industrial Partner and Participation for the Sponsored Project Liquid Desiccant based Solar Multi-Utility Heat Pump	MWE
Condenser Heat Recovery based Desalination System	RGSTC
Flexible Reconfigurable Fiber Laser Systems for Micro-scale Materials Processing	DST
Study and Development of Technology for Nano-Polishing of Single Crystal Semi-Spherical Cavity and Fabrication of Micrometallic Fluidic Structures	BARC
Process Development and Modeling of Novel EDM Variants for Micromachining	DST

Project Title	Sponsoring Agency
Multiscale Modeling of Composites	Monash University
Development of Competence in Coupled Electromagnetic-Structural Analysis	DST
Experimental study on the very high strain rate mechanical behavior of metal alloys	DRML
Development of parallel model reduction techniques for applications in solid and fluid mechanics	IRCC
webCNC – Internet Based Virtual CNC laboratory	MHRD
Experimental and numerical investigations on open pool fires	BARC
Influence of stiffness of the system and heat input waveform on transient CHF in horizontal channels under LPLF conditions	AERB
Demonstration and assessment of economic viability of new energy efficient and less polluting brick making technology (vertical shaft brick kiln)	Rajiv Gandhi Science and Technology Mission (Govt. of Maharashtra)
Completed Projects:	
Study of rarefield gas with application to outer space vehicle and microchannel	ISRO
Yarn Fault Classification With Artificial Neural Network	IRCC, IITB
Study Of Fluid Dynamics Of Interfaces With And Without Mass Transfer	BRNS
Development of Kerosene Based Nanofluid for Enhancement of Internal Forced Convection Heat Transfer	ISRO
Modeling and Measurement of Contact Conductance Between Two Structural Components	BRNS
OrthoCAD Network Centre for Endo-prosthetic Skeletal Reconstruction Systems	Office of Principal Scientific Advisor to GOI
Development of Mixed Refrigerant Joule Thompson Crycooler	DST
Design and Development of Moving Magnet Type of Linear Compressor Cryocooler	SEED, IITB
Development and Testing of 3 TR Liquid Desiccant based Solar Multi-Utility Heat Pump	MNRE
Exploratory Studies on Magnetic Pulse Welding of Tubes	ARDB
Computational Modeling of Laser-Assisted Machining at Micro and Macro Scales	IRCC, IITB
Generation of 3D Microscopic Hydro-phobic Geometries on Metallic surfaces using Excimer (UV) lasers	ISRO
Experimental Investigations on Transient CHF	AERB
Design, Development and Testing of Multihole Averaging Pitot Probe	M/S. Minco India Pvt. Ltd

Consultancy Projects

The department undertook 30 jobs generating Rs. 69,27,278. The total number of faculty involved was 10.

Patents

"Mechanism for Producing Woven (Interlaced) and Noobed (Non-interlaced) Three Dimensional Fabrics", being discussed with IIT Bombay patent attorney, A. Guha.

"Surgical Rod Cutter" being discussed with IIT Bombay patent attorney, A. Guha.

"An Unerring Alignment and Resection Guide Assembly", Indian Patent Filed, B.Ravi.

"Evacuated Glass Tube Solar Thermal Collector", Indian Patent Filed, M.V. Rane.
"Freeze Concentration System with Tabular Heat Exchangers", Indian Patent Filed, M.V. Rane.

"A method to reduce end defects in rolling of sections" Patent filed on March 19 2011, P.P. Date.

"Surgical Rod Cutter based on Inverse Slider Crank Mechanism" Indian Patent Application No. 1319/MUM/ 2012, Filed on 25 April 2012, R. K. Singh.

"Conformal Hydrodynamic Polishing Process and Machine", Invention disclosure filed, patent filing underway, R. K. Singh

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

Guha A.
"Optimization in Radiation Transport Containers", *21st International Conference on Structural Mechanics in Reactor Technology (SMiRT 21)*, New Delhi, India, November 6-11, 2011.

"New Methods of Dual Directional Shedding for 3D Weaving Using TRIZ Concepts", *International Conference on Invention, Innovation and Technology (ICIIT-2012)*, Kolkata, India, January 19-21, 2012.

Presented a paper on "Synthesis of Bar Linkage Mechanisms to Guide and Drive Rapiers", *13th World Congress in Mechanism and Machine Science*, Guanajuato, Mexico, June 19-25, 2011.

Sridharan A.K.
21st National and 10th ISHMT-ASME Heat and Mass Transfer Conference, IIT Madras, Chennai, Dec 28-30, 2011.

Puranik, B.P.
2nd National Symposium on Shock Waves, held on February 27-28, 2012 at the Periyar Maniammai University, Thanjavur, TN.

28th International Symposium on Shock Waves, held on July 17-24, 2011, at the University of Manchester, Manchester, UK.

Ravi, B.
"Technical Manpower Training for Foundries: NKN E-Foundry Mission," at the *60th Indian Foundry Congress*, held during March 2-4, 2012, at Bangalore.

"Automatic Optimization of Casting Feeders using Feed-paths Generated using VEM," *ASME International Mechanical Engineering Congress,* held during Nov 11-17, 2011 at Denver, USA.

Iyer K.N.
38th National Conference on Fluid Mechanics and Fluid Power, December 15-17, 2011, MANIT, Bhopal.

10th ISHMT-ASME Heat and Mass Transfer Conference, December 27-30, 2011, IIT Madras.

14th International Topical Meeting on Nuclear Reactor Thermal-hydraulics, NURETH-14, Toronto, Ontario, Canada, September 25-30, 2011

Atrey M.D.
"Development of 20 K Stirling type Two Stage U type Pulse Tube Cryocooler", held on 16-18th Nov. 2011, *(ACASC),* New Delhi.

"Design and Performance Evaluation of a cryogenic Heat Pipe", held on 16-18th Nov. 2011, *(ACASC),* New Delhi.

"Development of a miniature Joule Thomson Refrigerator using LTCC (low Temperature Co-Fired Ceramic) Technique", held 8th to 10 March 2012, *at ISPTS,* Pune.

"Investigations on Two-Phase Heat Exchanger for Mixed Refrigerant Joule-Thomson Cryocooler", held on 13-17 June, 2011, *Cryogenic Engineering Conference & International Cryogenic Materials Conference (CEC-2011) at* Spokane, USA.

"Characterization of Sorption Compressor for Mixed Refrigerant J-T Cryocooler", held on 13-17 June, 2011, *Cryogenic Engineering Conference & International Cryogenic Materials Conference (CEC-2011) at* Spokane, USA.

"Onset Behavior of Standing Wave Thermoacoustic Pressure Wave Gener**",** held on 13-17 June, 2011 at Cryogenic Engineering Conference & International Cryogenic Materials Conference (CEC-2011) *at* Spokane, USA.

Maiti S.K.
56th Congress of Indian Society of Theoretical and Applied Mechanics (ISTAM), 19-20 December, 2011, S.V. NIT, Surat.

"Experimental Measurement of Dynamic SIFs in Impact Bending Test", *21st Conference on Structural Mechanics in Reactor Technology (SMiRT 21)*, 6-11 November, 2011, New Delhi.

Pawaskar, D. N.
"Shape Optimization of Electrostatically Actuated Micro Cantilever Beam with Extended Travel Range using Simulated Annealing" at the *World Congress on Engineering 2011*, held during July 6-8, 2011, at London.

Bhandarkar U.V
"A study of Aviation Turbine Fuel-TiO_2 Nanofluids for Heat Transfer Augmentation in Rocket Engines", *21st National and 10th International ISHMT-ASME Heat and Mass Transfer Conference* held during 27-30 December, 2011 at IIT Madras, Chennai.

"A DSMC-MD Investigation of Wall Effects in a Shock Tube Operating at High Knudsen Numbers", *28th International Symposium on Shock Waves* held during July 17-22 , 2011 at Manchester, U.K.

"An Investigation of Pressure Boundary Conditions for the Simulation of a Micro-Nozzle using DSMC Method", *28th International Symposium on Shock Waves*, held during July 17-22 , 2011 at Manchester, U.K.

"A comparison of higher-order extensions to approximate Riemann solvers", *28th International Symposium on Shock Waves*, held during July 17-22 , 2011 at Manchester, U.K.

"Performance and Emission Analysis of Compression Ignition Engine Fuelled with Karanja and Jatropha Straight Vegetable Oils", *6th Annual International Symposium on Environment*, held during May 16-19 2011 at Athens, Greece.

Date P.P.
"A Numerical Criterion For The Formation Of A Solid State Welded Joint In Sheets By Electromagnetic Forming/Joining", in *Int. Conf. on Technology of Plasticity, ICTP* 2011, Aachen, Germany 2011.

"Control Of End Defect On Rolled Bar", in *Int. Conf. on Technology of Plasticity, ICTP* 2011, Aachen, Germany 2011.

"Study on the Formability & Shape Conformity of Mg & Al-alloy Sheets in Warm Condition by Electromagnetic Forming", in *Int. Conf. on High Speed Forming (ICHSF 2012)*, Dortmund, Germany, 2012.

Singh, R.
International Manufacturing Science & Engineering Conference, held on June 13-17, 2011at Corvallis, Oregon, USA.

Pande S. S.
"Effect of Particle Size in Aviation Turbine Fuel-Al2O3 Nanofluids for Heat Transfer Applications", *International Conference on Fluids and Thermal Engineering (ICFTE-11)* held during September 28-30, 2011 at Singapore.

Jagad P.I., Puranik, B.P., and Date, A.W.
"Study on Conjugate Heat Transfer Problems Using an Iterative Type of Numerical Procedure and Unstructured Meshes", Paper No: ISHMT-IND-03-012, {\em *21st National and 10th ISHMT-ASME Heat and Mass Transfer Conference*}, IIT Madras, Chennai (2011).

Sandipkumar Sonawane, Upendra Bhandarkar, Bhalchandra Puranik and S. Sunil Kumar
"Assessment of Aviation Turbine Fuel-TiO_2 Nanofluid for Heat Transfer Augmentation in Rocket Engines", *21st National and 10th ISHMT-ASME Heat Transfer Conference*, Chennai, India, December 2011.

Amarish D. Badgujar, Atrey M. D.
"Development of 20 K Stirling type Two Stage U type Pulse Tube Cryocooler", held on 16-18th Nov. 2011, *(ACASC), New Delhi.*

Gaurav S. Adke, Atrey M.D.
"Design and Performance Evaluation of a Cryogenic Heat Pipe", held on 16-18th Nov. 2011, *(ACASC), New Delhi.*

Rajeev Hatwar, Shrikant Ambad, Mrunmayi Kumbhalkar, Trilok Singh , Atrey M. D.
"Development of a miniature Joule Thomson Refrigerator using LTCC (low Temperature Co-Fired Ceramic) Technique", held 8th to 10 March 2012, *at Pune ISPTS,.*

Sudheer. S and S.V. Prabhu
"Behavior Of Small Lumped Bodies Immersed In Diesel Pool Fires", *Conference on Fire Science and Technology – Research and its Implementation*, Central Building Research Institute, Nov. 2011, Roorkee.

Sumeet Shivani, Saket Singh, Sudheer Siddapureddy and S. V. Prabhu
"Influence of External Heat Flux and Coating Thickness of Intumescent Coatings on the Fire Resistance to Stainless Steel", *Conference on Fire Science and Technology – Research and its Implementation*, Central Building Research Institute, Nov. 2011, Roorkee.

Kailash Golecha, T.I. Eldho, S.V. Prabhu
"Investigation of Single and Two Deflector Plate on the Performance of Modified Savonius Water Turbine", *11th Asian International Conference on Fluid Machinery and 3rd Fluid Power Technology Exhibition*, Dec 2011, I.I.T., Madras, Chennai.

Venugopal, Amit Agrawal, S.V. Prabhu
"Comparison of Piezo-sensor and Differential Wall Pressure Sensor for Vortex Flowmeter Application", *11th Asian International Conference on Fluid Machinery and 3rd Fluid Power Technology Exhibition*, Dec 2011, I.I.T., Madras, Chennai.

"Analysis of Vortex Flowmeter Signal with Empirical Mode Decomposition and Autocorrelation Function", *I.U.T.A.M Conference* held at I.I.T., Kanpur Dec 2011.

"Installation Effects on the Performance of Vortex Flowmeter with Piezo-sensor", *Floteg Conference* held at Fluid Control Research Institute held Dec 2011.

Kailash Golecha, T.I. Eldho, S.V. Prabhu
"Performance characteristics of Darieus Turbines", *Fluid Mechanics and Fluid Power Conference*, Dec 2011, M.A.N.I.T., Bhopal

Anirban Guha and C. Amarnath
"Synthesis of Bar Linkage Mechanisms to Guide and Drive Rapiers", *13th World Congress in Mechanism and Machine Science*, Guanajuato, Mexico, June 19-25, 2011.

Kuldeep Sharma, D. N. Pawaskar, A. Guha and R. K. Singh
"Optimization in Radiation Transport Containers", *21st International Conference on Structural Mechanics in Reactor Technology (SMiRT 21)*, New Delhi, India, November 6-11, 2011.

H. P. Dave and A. Guha
"New Methods of Dual Directional Shedding for 3D Weaving Using TRIZ Concepts", *International Conference on Invention, Innovation and Technology (ICIIT-2012*), Kolkata, India, January 19-21, 2012.

P. M. Ardhapurkar, Arunkumar Sridharan and M. D. Atrey
"Investigations on Two-Phase Heat Exchanger For Mixed Refrigerant Joule Thomson Cryocooler," *Cryogenic Engineering Conference and International Cryogenic Materials Conference (CEC/ICMC 2011)*, Spokane, Washington, USA, June 13-17, 2011.

AH Razaak, R.M Sonar and A.Subash Babu
"Criterion Weights for KM integrated Quality Accreditation System for Indian Engineering Education using AHP", *14th International Business Research Conference* , April 2011, Dubai.

Sandipkumar Sonawane, Bhalchandra Puranik, Upendra Bhandarkar and S. Sunil Kumar
"Effect of particle size in Aviation Turbine Fuel-Al_2O_3 Nanofluids for Heat Transfer Applications", *International Conference on Fluid and Thermal Engineering*, Singapore, September 2011.

M. P. Ray, B. P. Puranik and U. V. Bhandarkar
"A Comparison of Higher-order Extensions to Approximate Riemann Solvers", *28th International Symposium on Shock Waves*, Manchester, UK, July 2011.

D. S. Watvisave, B. P. Puranik and U. V. Bhandarkar
"A DSMC-MD Investigation of Wall Effects in a Shock Tube Operating at High Knudsen Numbers", *28th International Symposium on Shock Waves,* Manchester, UK, July 2011.

"An Investigation of Pressure Boundary Conditions for the Simulation of a Micro-nozzle using DSMC Method", *28th International Symposium on Shock Waves*, Manchester, UK, July 2011.

P. I. Jagad, B. P. Puranik and A. W. Date
"A Finite Volume Procedure on Unstructured Meshes for Fluid-structure Interaction Problems", *ICCFD 2011: International Conference on Computational Fluid Dynamics*, Paris, France, July 2011.

R. Srinivasa Rao, Teany Thomas, Kannan N Iyer, S. K. Gupta
"Development of Condensation Model and Implementation in CFD Code for Hydrogen Distribution Calculations", *Div-III:* Paper ID#418. *Transactions,* SMiRT 21, 6-11 November, 2011, New Delhi, India.

R. Srinivasa Rao, Teany Thomas, Kannan N Iyer, S. K. Gupta
"Validation of THE Condensation Model For Containment Thermal Hydraulics", NURETH 4-406, the *14th International Topical Meeting on Nuclear Reactor Thermal-hydraulics, NURETH-14*, Toronto, Ontario, Canada, September 25-30, 2011.

Ardhapurkar P. M., Sridharan Arunkumar, Atrey M. D.
"Investigations on Two-Phase Heat Exchanger for Mixed Refrigerant Joule-Thomson Cryocooler', held on 13-17 June, 201,1 *Cryogenic Engineering Conference & International Cryogenic Materials Conference (CEC-2011*) *at Spokane, USA*

Mehta R.N., Bapat, S. L., Atrey M. D.
"Characterization of Sorption Compressor for Mixed Refrigerant J-T Ceyocooler", held on 13-17 June, 2011, *Cryogenic Engineering Conference & International Cryogenic Materials Conference (CEC-2011) at Spokane, USA*

Naik H. B., Mehta S., Desai K., Atrey M. D.
"Onset Behavior of Standing Wave Thermoacoustic Pressure Wave Gener**",** held on 13-17 June, 2011 at *Cryogenic Engineering Conference & International Cryogenic Materials Conference (CEC-2011) at Spokane, USA.*

Samanta, A., Teli, M. and Singh, R.
"Surface Integrity in Laser Assisted Mechanical Micro-Machining of (LAMM) of Inconel 625", *Proceedings of the 7th International Conference on MicroManufacturing,* Northwestern University, Evanston Ill, USA. March 12-14, 2012, pp 47-54.

Bajpai, V., and Singh, R.
"Finite Element Modeling of Orthogonal Micromachining of Anisotropic Pyrolytic Carbon via Damaged Plasticity", *Proceedings of the 7th International Conference on MicroManufacturing,* Northwestern University, Evanston Ill, USA. March 12-14, 2012, pp 478-484.

Dongre, G., Singh, R. K. and Joshi, S. S.
"Parametric Analysis of Silicon Ingot Slicing by Wire-EDM using Response Surface Methodology (RSM)", *37th IEEE Photovoltaic Specialists Conference*. Washington State Convention Center. Seattle, Washington. June 19-24, 2011.

Kedar S.J., Sheriff A.K.H.M., Bhandarkar U., and Sreedhara S.
"Performance and Emissions Analysis of Compression Ignition Engine Fuelled with Jatropha and Karanja Oils", *6th Annual International Symposium on Environment*, Athens, Greece, 16-19 May 2011.

Weismiller M.R., Chowdhury A., Thynell S.T., and Yetter R.A.
"Ammonia Borane Decomposition at High Heating Rates," *7th US National Technical Meeting of the Combustion Institute*, Atlanta, Ga, 2011.

Conferences/Symposia/Workshops/ Seminars (Coordinated/Chaired by Faculty)

P.P.Date
Chaired a session in *International Conference on Technology of Plasticity – ICTP,* 2011, Aachen Germany, September 2011.

Chaired a session in *International Conference on High Speed Forming – ICHSF,* 2012 Univ. of Dortmund, Germany, April 2012.

Conducted a *QIP Programme on Analysis of modern Manufacturing Processes,* February 2012.

Conducted a *CEP course on Sheet Metal forming for Godrej and Boyce,* PCS Division.

Sreedhara S.
Conducted a *CEP Course on Turbulence and its modeling,* 13-14 August, 2011.

Conducted a *SERC school on: Combustion in Energy Sector,* July 7-11, 2011.

S.V.Prabhu
Conducted a *Coordinators workshop on heat transfer, 12-16 September,* 2011.

Conducted an *ISTE Workshop on Heat Transfer,* November 29-December 10, 2011.

Conducted a *CEP Course on Computer Aided Engineering (CAE),* 2-4 September, 2010.

U.N.Gaitonde
Conducted a *Coordinators workshop on Thermodynamics in Mechanical Engineering,* February, 2011.

Conducted an *ISTE Workshop on Thermodynamics in Mechanical Engineering,* June, 2011.

U.V.Bhandarkar
Conducted a *Coordinators workshop on Thermodynamics in Mechanical Engineering,* February, 2011.

Conducted an *ISTE Workshop on Thermodynamics in Mechanical Engineering,* June, 2011.

Babu A.S.
Chaired a session during the *International Conference on Recent Advances in Mechanical Engineering, (INCRAME 2011)*, April 2011, organized by Dr MGR University , Chennai.

Chaired a session during the *Conference on Emerging Trends in Industrial Engineering , organized by NIT Calicut* , July 2011

Chaired a session during the *International conference on Simulation* Organized by IDP - IEOR at IIT Bombay during February 2012.

Puranik, B.P.
Chaired the session on "Shock Waves in Chemistry," *2nd National Symposium on Shock Waves*, February 27-28, 2012 at the Periyar Maniammai University, Thanjavur, TN.

Conducted an *E-Outreach Course on Computational Fluid Dynamics,* 12-16 March, 2012.

Ravi, B.
Chaired a technical paper session at the *60th Indian Foundry Congress*, held during March 2-4, 2012, at Bangalore.

Conducted a *CEP Course on Casting Design and Simulation,* 5-8 September, 2011.

Atrey M.D.
Chaired a session during "A*sian Conference on Applied Superconductivity and Cryogenics" (*ACASC *),* held on 16-18 Nov., *2011,* New Delhi.

Conducted a *CEP Short Term Course on Advances in Cryocooler Technology,* 02-06 May, 2011.

Kulkarni S.
Participated in *CAR-TIFAC Panel meeting on Electromagnetic Manufacturing* held on May 04, 2012 at BARC, Mumbai.

Maiti S.K.
Chaired the session on "Leak-Before-Break and Numerical Methods (2/2)", *21st Conference on Structural Mechanics in Reactor Technology (SMiRT 21)*, 6-11 November, 2011, New Delhi.

Pande S.S.
Chaired the session on "Metal forming , Joining and Composite Fabrication," at the *International Conference on Computational Methods in Manufacturing* (ICCM 2011), held at IIT Guwahati, India , 15-16 Dec 2011.

Singh, R.K.
Chaired session Joining 1, ASME 2011 *International Manufacturing Science & Engineering Conference*, held on June 13-17, 2011 at Corvallis, Oregon, USA.

Invited Lectures

Agarwal A.
"Gas Flow in Microchannel", 1-day *Symposium on Microfluidics and Microdevices*, Indian Institute of Technology, Kanpur, 21 April 2012.

"Flow Boiling in Microchannel with Application to Electronic Cooling", *International Workshop on the Physics of Semiconductor Devices*, Indian Institute of Technology, Kanpur, 21 December 2011.

Chowdhury A.
Delivered lectures at DRDO as part of a CEP program on "Combustion in IC Engines", June, 2011.

Jonnalagadda K.N.
Delivered lectures at DRDO as part of a CEP program on "High strain rate characterization of materials".

Sridharan A.K.
"Two Phase Heat Transfer" at the *CEP course Advances in Cryocoolers*, IIT Bombay, May 2011.

Babu A.S.
Delivered Key Note address on "Technology Management and Industrial Engineering", *Conference on Emerging Trends in Industrial Engineering*, organized by NIT Calicut , July 2011.

Delivered a Plenary lecture on Technology Management, *International Conference on Recent Advances in Mechanical Engineering, (INCRAME 2011),* April 2011, organized by Dr MGR University , Chennai.

Delivered Key Note address on "Manufacturing Excellence: Some Perspectives", during the *Conference on Operations & Competitive Excellence (COMEx 2012)* organized by IIIE Nagpur Chapter and RB College of Engineering , Nagpur, March 2012

Delivered Plenary Lecture address on "In Roadmap to Manufacturing Excellence", during the *Conference on Operations & Competitive Excellence (COMEx 2012)* organized by IIIE Nagpur Chapter and RB College of Engineering , Nagpur, March 2012.

"Multi criteria Decision Making", ISTE Programme organized by College of Engineering , Goa ; June, 2011.

"Technology Management", Department of Mechanical Engineering, VNIT, Nagpur , March 2012.

Delivered an invited seminar on "Technology Management with application of analytical tools: A New Approach" , Department of Industrial Engineering, King Saud University , Riyadh, Saudi Arabia(June 21, 2011).

Delivered an invited seminar on " Perspectives and Recent Practices of Quality Management" , Department of Industrial Engineering, King Saud University , Riyadh, Saudi Arabia(February 13, 2012)

Delivered an invited seminar on "An integrated method to evaluate suppliers" , Department of Industrial Engineering, King Saud University , Riyadh, Saudi Arabia (February 15, 2012)

Bhandarkar U.V
"Simulation of shocks using DSMC", *2nd National Symposium on Shock Waves* held during 27-28 February, 2012 at Periyar Maniammai University, Thanjavur.

Ravi, B.
"Bio-Medical Engineering," GMR College of Engineering, Razam, December 28, 2011.

"NKN E-Foundry: Cloud-based Simulation and E-learning," Anna University, Chennai, December 14, 2011.

"Role of Information Technology in Manufacturing" *2nd National Workshop on Recent Trends in*

Manufacturing – Foundry Technology, Walchandnagar College of Engineering, Sangli, February 4-5, 2011

"Research Themes in Advanced Manufacturing in India," at the *UK-India Workshop on Advanced Manufacturing*, held during January 30-31, 2012, at New Delhi.

"Idea to Reality – Making it Possible," with Dr. Manish Agarwal, at the *India Orthopedic Innovations Conclave*, held on December 6, 2011, at New Delhi..

Iyer, K.N.
"Ashwath Narayana Memorial Lecture", *38th National Conference on Fluid Mechanics and Fluid Power*, December 15-17, 2011, MANIT, Bhopal.

"Hydrogen Management in Nuclear Reactor Containment", in the *Theme Meeting on Severe Accident Analysis and Experiments*, Organised by Safety Research Institute, Kalpakkam, India.

"Indo-US Bilateral Academic Research Program: Expanding the Horizon", *Symposium on Framework for Indo-US Nuclear Education Cooperation*, October 1, 2011

Atrey, M.D.
"Research and Development on single and multistage Pulse Tube Cryocoolers at IIT Bombay", at TIFR Colaba, Mumbai, 4th Nov. 2011.

"Cryogenics and Super Conductivity", five-day *CEP course on Magnetic Resonance Imaging* at IIT Bombay, Mumbai, 20th -24th June 2011.

"MRI Cryogenics", five-day *CEP course on Magnetic Resonance Imaging* at IIT Bombay, Mumbai, 20th -24th June 2011.

"Super Conducting Magnets", five-day *CEP course on Magnetic Resonance Imaging* at IIT Bombay, Mumbai, 20th -24th June 2011.

"Cryocoolers", five-day *CEP course on Magnetic Resonance Imaging* at IIT Bombay, Mumbai, 20th -24th June 2011.

"Cryocooler Technology Development", at State Solid Physics Laboratory, DRDO, New Delhi , 14 th Oct, 2011.

"Cryocoolers Technology", at Dept. of Mech. Engg., National University of Singapore (NUS) , June 10th 2011.

"Cryocooler Technology at IIT Bombay" , at Karlsruhe Institute of Technology (KIT), Germany, 28 th July 2012.

"Pulse Tube Cryocoolers Development at IIT Bombay", Institute of applied Physics, University of Giessen, Germany, 25 July 2012

Rane, M.V.
"Industrial Green Chemistry World 2011," Industrial Green Chemistry World, IGCW, Newreka Green-Synth Technologies Pvt Ltd, Mumbai, December 6, 2011.

"Low Temperature Application in Industrial Process Heat and Cooling Options," World Institute of Sustainable Energy, WISE, Solar Technology for Industrial Process Heating, Pune, July 12, 2011.

"Energy Efficiency in HVAC Systems," Centre for Sustainable Development, Bangalore, May 14, 2011.

"The Launch of First e Book on Green Technology and Energy Efficiency," The Green Tree Foundation, Mumbai, April 19, 2011.

Singh, R.K.
"Hybrid and Reconfigurable Micromanufacturing Processes," Walchand College, Sangli, February 4, 2012

"Micromanufacturing Processes and Simulation," Veermata Jijabai Technological Institute, Mumbai, November 18, 2011

Maiti, S.K.
"Component Health Monitoring Based on Measurement of Changes in Natural Frequencies", *56th Congress of Indian Society of Theoretical and Applied Mechanics (ISTAM)*, 19-20 December, 2011, S.V. NIT, Surat.

Prabhu S.V.
"Radiative Properties of Open Pool Fires", February 2011, Jain University, Bangalore.

Bhandarkar U.V.
"Modeling fluid flow using Molecular Methods", IIT Gandhinagar, March 16, 2012.

"Numerical Investigation of High Speed, High Knudsen Number Flows", Nirma University, Ahmedabad, March 17, 2012.

Pande S.S.
Invited to present a Key note lecture on "Web based Collaborative Product development", at the *International Conference on Computational Methods in Manufacturing (ICCM 2011)*, held at IIT Guwahati, India , 15-16 Dec 2011.

Significant Awards/Distinctions

Babu A.S.
Member of the Editorial Advisory Boards of Journal of Advances in Management Research, International Journal of Advanced Operations Management, International Journal of Indian Culture and Business Management and International Journal of Information and Operations Management Education.

Served as a Member of the Judges Committee of the Global Competition for WCM Award, A.V Birla Group of Companies (September 2011).

Ravi, B.
"Dr. P.K. Patwardhan Technology Development Award," for high-quality low-cost tumour knee prosthesis, IIT Bombay, Mumbai, September 2011.

"DST-Lockheed Martin India Innovation Award," for fast, accurate and affordable casting solidification simulation technology, DST, New Delhi, March 2012.

Jonnalagadda K.
Jonnalagadda et al. 2010, Hetenyi Award for Best Research Paper published in the journal Experimental Mechanics in 2010.

Membership of Scientific Societies/Bodies/ Organisations

Pawaskar, D.N.
Member of American Society of Mechanical Engineers.
Member of Society for Industrial and Applied Mathematics.

Ravi, B.
Associate Editor, Indian Foundry Journal.
Fellow Member, Institute of Engineers (India)
Member, Institute of Indian Foundrymen
Member, Editorial Board, Bio Fabrication Journal, Rapid Prototyping Journal

Agarwal A.
Member, National Academy of Sciences India (NASI), Allahabad.

Rane, M.V.
Life Member of Indian Society of Heating Refrigerating and Air-Conditioning Engineers (ISHRAE)
Member of American Society of Heating Refrigerating and Air-Conditioning Engineers (ASHRAE)

Singh, R.K.
Member of Society of Manufacturing Engineers (SME).
Member of American Society of Mechanical Engineers (ASME).

Pande, S.S.
Member, Program Advisory Committee, SERC Council, Dept of Science and technology (DST), Govt. of India.
Member, Board of Studies, Indian Institute of Industrial Engineering, IIIE.
Member, National Advisory Committee, AIMTDR Conference.
Member, Advisory Committee, *International Conference on Computational Methods in Manufacturing* (ICCM 2011), IIT Guwahati, 15-16 Dec 2011.

Sreedhara S.
Life member for ISTE (Indian Society for Technical Education).
Member for Combustion Institute.
Member for SAE India.
Member for ASME.

Prabhu, S.V.
Taking care of National Society of Fluid Mechanics and Fluid Power as Secretary since Dec 2011.

Bhandarkar U.V.
American Physical Society

Honorary Work

Agrawal, A.
Reviewed papers for International Journal of Heat and Mass Transfer
Reviewed papers for Microfluidics and Nanofluidics.
Reviewed papers for Experimental Thermal and Fluid Sciences.
Reviewed papers for Applied Thermal Engineering.
Reviewed paper for Experiments in Fluids.
Reviewed paper for Artificial Life.
Reviewed paper for International Journal of Thermal Sciences, and for several other journals.

Guha, A.
Reviewed papers for Textile Research Journal

Sridharan, A.K.
Reviewed papers for International Journal of Advances in Engineering Sciences and Applied Mathematics

Babu, A.S.
Reviewed papers for various international journals including International Journal of Production Research, International Benchmarking Journal and ASME Journal of Manufacturing Science and Engineering.

Guest Edited the special issue "Applications of Multi Criteria Decision Analysis in Manufacturing Systems' of International Journal of Industrial and Systems Engineering , (with AU Rehman and Ahmari) (July 2011)

Date, A.W.
Reviewed 11 papers for IJHMT, Int-Jnl-of-Thermal-Sc, NHT, Indian Jnl of Physics, Int Communications Heat/ Mass Transfer, Chemical Engg Science.
Reviewed 2 Research proposals for DST, New Delhi.
Reviewed 1 Research Proposal for Rajiv Gandhi S & T Mission, Govt. of Maharashtra.

Jonnalagadda, K.N.
Reviewed papers for Journal of Experimental Mechanics.

Atrey, M.D.
Reviewed Promotion Documents for the post of Principal Scientific Officer, IISC, Banglore, March 2012
Reviewed paper for Solar Energy Journal,
Reviewed paper for Indian Journal of Cryogenics
Reviewed paper for Indian Journal of Cryogenics

Maiti, S.K.
Reviewed one paper for Engineering Fracture Mechanics, September, 2011.
Reviewed one paper for Journal of Sound and Vibration, October, 2011.
Reviewed one paper for International Journal of Mechanical Sciences, November, 2011.
Reviewed two papers for Engineering Fracture Mechanics, January, 2012.

Pande, S. S.
Reviewer of research papers for several Intl. research journals – Computer Aided Design, Intl Journal of Advanced Mfg Technology, Intl Journal of Production Research, Computers in Industry, Journal of Eng. Manufacture, Institute of Mechanical Engineers(UK) , CIRP Journal of Manufacturing Science, Applied Soft Computing, Intl. Journal of Machine Tools and Manufacture, Applied Thermal Engineering, Journal of Manufacturing Science and Technology

Prabhu, S.V.
Reviewed papers for International Journal of Thermal Sciences, Measurement, Experimental Thermal and Fluid Sciences and International Journal of Heat and mass transfer

Gaitonde, U. N.
Reviewed papers for the journal 'Solar Energy', 2011-2012.

Bhandarkar, U.V.
Reviewed proposals for DST.

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
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
Mechanical Metallurgy, Sheet Metal Forming and Material Testing, Forming Processes and Tools, Materials Testing, Forming Processes and Tools, Materials used in Metal Forming

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
Non-linear Dynamical Systems and Control, Micro Electro Mechanical Systems

14. U. N. Gaitonde
Thermodynamics, Heat Transfer, Thermal Engineering, Cooling of Equipment, Power Plant Engineering

15. A. Guha
Neural Networks in Textiles

16. K. N. Iyer
Nuclear Reactor Safety, Thermal-Hydraulics, Applied Numerical Methods

17. S. D. Jog
Political economy, General Management, Finance, Engineering Basic Practice and Communications

18. S. S. Joshi
Machining of Composite Materials, Computer-aided Modelling Machining and Nanomachining, Surface integrity and mechanical characterization

19. K. P. Karunakaran
CNC, Computer Graphics, Genetic Algorithms, Manufacturing Automation, Rapid Prototyping and Tooling

20. S. S. Kulkarni
Computational Mechanics

21. D. N. Manik
Vibration, Noise Control and Mechatronics

22. S. K. Maiti
Stress Analysis, Fracture Mechanics, FEM, BEM, Smart Structures, NDT

23. S. S. Pande
Intelligent CAD/CAM, Computer Graphics, CNC, Computer Aided Process Planning, Tool Design

24. D. N. Pawaskar
Solid Mechanics, MEMS, Fatigue, Fracture in Solids, Optimization & Design

25. 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, spray cooling of nuclear reactor containment

26. B. P. Puranik
Experimental Fluid Mechanics, Gas Dynamics, Thermal Hydraulics

27. M. V. Rane
Waste Heat recovery Systems, Absorption Refrigeration System, Heat Pumps, Compact Milk Pasteurizers, Dryers, Energy Conservation, Alternate Energy Resources

28. 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

29. P. Seshu
Stress and Aibration Analysis,FEM,Computer-Aided Simulation, Smart Structures, Active Vibration Control

30. A. Sharma
Computational Fluid Flow & Heat Transfer

31. A. K. Sridharan
Two Phase Heat Transfer & Fluid Mechanics

32. H. R. Srirangarajan
Non Linear Vibration, Machine Dynamics, Strength of Materials

33. S. Suryanarayanan
Automatic Control, Mechatronics, Wind Energy, Intelligent Transportation Systems,Active Flow Control

34. R. K. 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

35. V. G. Ukadgonker
Solid Mechanics, Elasticity, Fracture Mechanics, Computer Aided Solutions, Pressure Vessel Design

36. R. P. Vedula
Convective Heat Transfer for External and Internal Flows

37. S. Sreedhara
Direct Numerical Simulations of Reactive flows; Modelling Turbulent Combustion, Flamelet, CMC IC engines, spray, combustion and emission; Combustion/emission in Gas Turbine

38. A. Chowdhury
Ignition and combustion of energetic materials and alternate fuels.

39. V. Karthik
Dynamics & Control, Vibrations of Continuous Structures, Nonlinear Dynamics & Chaos, Nanoscale Device Physics & Fabrication

40. A. Srivastava
Laser-based measurements for fluid flow and heat and mass transfer, Optical Tomography, Experimental Heat and Mass Transfer, Heat Transfer in Mini and Micro Channels, Bio-Engineering and Bio-Heat Transfer, Biomedical Applications of Lasers.

41. A. Tewari
Microstructural-mechanics.

42. A. Gupta
Haptics, robotics and controls.

43. T. Bhandakkar
Fracture Mechanics, Micromechanics, Continuum mechanics, Analytical and numerical methods.

Metallurgical Engineering & Materials Science

Introduction

The Department of Metallurgical Engineering & Materials Science is one of the largest departments in the country with a faculty strength of 31 engaged in teaching and research in almost every area of materials engineering like ferrous and non-ferrous metallurgy, physical metallurgy, structural and electronic ceramics, polymers, biomaterials, computational materials science and corrosion engineering. The department has added 18 more bays of space to cater to the increased faculty strength and their requirement for research infrastructure. With all these developments the department is poised well to take up new challenges in materials research and education.

Academic Programmes

The M.Tech. programme of the department has four specialisations, namely, Process Metallurgy, Materials Science, Steel Technology, and Corrosion Science and Engineering. The department is also involved in the M.Tech. degree course in Materials, Manufacturing and Modelling (MMM) along with the Departments of Mechanical Engineering and Mathematics. Last year the department hired seven new faculty members in different areas of materials engineering. The new laboratory courses that were started are running successfully and the students are getting exposed to novel methods of solving problems in Computational Materials Science, Equipment Design and Thin Film Processing.

Degrees Awarded		
B.Tech.	:	44
Dual Degree	:	38
M.Tech.	:	23
Ph.D.	:	09

R & D Activities

Areas of research where major contributions have been made and efforts are going on are advanced steel making, metal forming, thin films & devices, electronic materials, mechanical behaviour of materials, advanced composites, surface engineering and corrosion studies, materials for health care, nano-materials, polymer engineering and materials modelling and design. Green technologies depend severely on materials and materials processing. Keeping in view these developments, the department has focused its efforts in establishing new capabilities and tools in areas of thin films, advance composites with nano-materials, electronic and magnetic materials, new alloys and nanomaterials technology. The underlying philosophy of the research culture of this department is to use the principles of basic sciences and engineering to understand the behaviour of materials, and then to apply this understanding to develop technologies of national importance in energy, defense, health care, space and agriculture.

The department is making tremendous progress in its research capabilities. The number of sponsored research at consultancy jobs has increased substantially.

Sponsored Research Projects

Sponsored Research Projects :		
New	:	09
Ongoing	:	12

Some of the sponsored research projects are listed below:

Project Title	Sponsoring Agency	Status
Direct Observations On Microstructural / Microtextural Development In Zr Based Alloys During Annealing And Irradiation.	BRNS	New
Synthesis Of Pure/composite Metal Oxide Nanoparticle Slurries To Achieve High Selectivity Of Cmp Processes.	Applied Materials Inc.	New
Development Of A 10 W Solid Oxide Fuel Cell Operational At Intermediate Temperatures. Phase 1: Scaling To A 100 W System	DRDO	New
Technical Consultancy On Numerical Prediction Of Temperature Field And Residual Stresses In Laser Deposited FGMs	DRDO	New
Fabrication Of Dendritic Magnetomers For Biomedical Applications	DST	New
High Throughput A-Si:H Based Tandem Solar Cells On Low Cost Flexible Substrates	DST	New
Studies On Titania Paste, Film Characteristics And Design And Reliability Of DSSC Modules	DST	New
The Role Of Pre-Form Strain (PFS) And Short Burst Annealing (SBA) On The Hardening/softening And Formability Characteristics Of Automotive Sheet Alloys	General Motors	New
DST Postdoctoral Fellowship In Nano Science And Technology-3 Rd Series	Javwaharlal Nehru Centre for Advanced Scientific Research	New
To Develop HWCVD Based Thin Film Silicon Micro-morph Solar Cells.	Applied Materials Inc.	Ongoing
Development Of Technology To Fabricate A-Si:H Based Thin Film Multi-junction Solar Cells On Steel Substrates	Tata Steel Ltd.	Ongoing
Support For Operation And Maintenance And Upgradation Of The National Facility Of Texture And OIM	BRNS	Ongoing
Development Of Multifunctional Magnetic Nanoparticles For Cancer	Dept. of Information Tech.	Ongoing
Development Of Doped Ceria Based Composite Electrolyte For Intermediate Temperature Solid Oxide Fuel Cell.	DRDO	Ongoing
Phase Field Modelling Of Microstructural Evolution In Magnetic Thin Films.	DRDO	Ongoing
Novel Organic Modifier Induced Non-covalent Modification Of Carbon Nanotubes: Assessing The State Of Dispersion In Aqueous And Organic Solvents And In Various Polymer Matrices	DRDO	Ongoing

Project Title	Sponsoring Agency	Status
High Density Tape Cast Ferrite Thick Films For Microwave Applications	DRDO	Ongoing
Multiwall Carbon Nanotubes Reinforced Composite Fiber: Control And Assessment Of Multiwall Carbon Nanotubes Dispersion In Semi-crystalline Polymer Matrix	DRDO	Ongoing
Effect Of Chemical, Microstructural Modifications Of The Nano Titania Photoanode On The Performance Of Dye Sensitized Solar Cells	DST	Ongoing
Microwave Losses In Ferrite Thin Films For Meta-materials	DST	Ongoing
On The Microstructure Origin Of The Fatigue Behavior	John Deere India Pvt. Ltd., Pune	Ongoing

Consultancy Projects

The department undertook 40 jobs generating Rs. 2,20,41,092. The number of faculty members involved was four.

Patent

Bahadur, D.
"A Biosensor Comprising Functionalized Magnetic Nanoparticles", Indian Patent filed 2011 (1898/Mum/2011).

"Fe_3O_4 Nanoparticles Embedded Zno Assemblies", IPA No. 3362/Mum/2011, Filed on: 30 November 2011.

Extension Activities

CEP courses

"Heat Treatment and Failure Analysis of Gears", I.I.T. Bombay, Feb. 2012.

One-day Workshop, "Fracture Toughness Testing of Materials", Student Chapter, I.I.M. Mumbai, A.S.M. International India Chapter and NACE International India Chapter, I.I.T. Bombay, Oct. 2011.

Visitors to Department

Prof. P. Bandaru, UC, SanDeigo. He delivered a talk on "Does Nanotechnology Really Help, for Higher Thermal-Electrical Conversion Efficiency, in Thermoelectric Materials?"

Prof. Noam Eliaz, Tel Aviv University, Israel. He delivered a talk on "From Monitoring the Wear of Natural joints to Electrocrystallization of Calcium Phosphates for Orthopaedic Implants."

Dr. Heinrich Lang, University of Chemnitz, Germany. He delivered a lecture on "New Materials and Chemistry, Small Molecules Great Progress".

Dr. Mangal Roy, Washington State University. He delivered a talk on "Engineered Bioceramics for Next Generation Implants".

Prof. J.M.D. Coey, Trinity College Dublin. He delivered a talk on "Dilute Ferromagnetic Oxides and D-zero Magnetism – Fact or Fantasy ?"

Dr. E.M.T. Velu, Western Digital corporation, USA. He delivered a talk on "Research on Magnetic Recording Media for the Internet Age".

Prof. Peter Hodgson, Deakin University, Australia. He delivered a talk on "Application of 3D Atom Probe Tomography to Improve our Understanding and Engineering of Steels at the Nano and Atomistic Scales".

Conference/Workshop (participated/papers presented)

Doiphode, R. L., Narayana Murty, S. V. S., Prabhu, N., Kashyap, B. P.
"Effect of High Temperature Caliber Rolling of Mg-alloy AZ31 on its Microstructure and Room Temperature Tensile Properties", Poster Presentation, *National Symposium on Advances in Materials Science and Technology (AMST 2012)*, Feb. 3-4, 2012, University School of Sciences, Gujarat University, Ahmedabad.

Prabhu, N., Kashyap, B. P., Hodgson, P. D., Rahul Kulkarni, Pabitra Palai, Srinivas, V.
"The Effect of Die-Shape and Die parameters in ECAP on the Microstructure and Flow Properties of some 2-phase Alloys", Poster Presentation, *TMS (The Minerals, Metals and Materials Society)*, **2012**, March 11-15, 2012, Oralando, Florida, U. S. A.

Rahul Kulkarni., Nithyanand Prabhu., Peter Hodgson, D., Bhagwati Kashyap, P.
"Phase Dissolution of ã- $Mg_{17}Al_{12}$ during Homogenization of as-cast AZ80 Magnesium Alloy and its Effect on Room Temperature Mechanical Properties", Poster Presentation, *TMS (The Minerals, Metals and Materials Society),* 2012, March 11-15, 2012, Oralando, Florida, U. S. A.

Mukhopadhyay, A.
"*In-situ* investigation of Stress Development due to Surface Processes in Graphitic Carbon Electrodes in Li-ion batteries," (co-authors: Tokranov, A., Xiao, X. and Sheldon, B. W.); *Gordon Research Conference on Batteries*, held during March 4-9, 2012, at Ventura, CA, USA.

"Stress Development due to Surface Processes and High Rate Capability of Graphitic Carbon Thin Film Electrodes in Li-ion Batteries," (co-authors: Hurt, R., Xiao, X. and Sheldon, B. W.); *International Conference on Supramolecules and Nanomaterials – Research and Applications* (*ICSNA 2012*), held during February 6-8, 2012, at Gujarat University, Ahmedabad, India.

"*In-situ* Stress Measurement in Thin Films using Multi-beam Optical Stress Sensor (MOSS)," *International Conference on Advances in Energy Research (ICAER 2011)*, held during December 9-11, 2011, at IIT Bombay, Mumbai.

Salame, P., Om Prakash., Ajit Kulkarni
"Dielectric and Electrical Conductivity Studies of T2 - type Eu2CuO4", *International Conference on Electroceramics-2011 (ICE-11)* Sydney, Australia, 12-16 Dec 2011.

Salame, P., Om Prakash., Ajit Kulkarni
"Dielectric and AC Electrical Conductivity Studies of Layered Ln_2CuO_4 (Ln = Nd, Gd) Ceramics" *International Conference & Workshop on Nanostructured Ceramics and other Nanomaterials (ICWNC)* New Delhi, 13-16 March 2012.

Supratim Mitra., Ajit R Kulkarni., Om Prakash
"Grain Growth Behaviour in Lithium Sodium Niobate Ceramics", "*International Conference & Workshop on Nanostructured Ceramics and other Nanomaterials, (ICWNC)"* New Delhi, 13-16 March 2012.

Shobha Shukla., Sumit Saxena., Eric Mazur
"Investigation of Optical Properties of layered MoS_2" *Technical Proceedings of the 2012 Nanotechnology Conference and Trade Show*, Nanotech 2012, Santa Clara, CA, USA.

Shobha Shukla., Sumit Saxena., Seungyeon Kang., Eric Mazur
"Patterning and Reduction of Graphene Oxide Using Femtosecond-laser Irradiation," *Technical Proceedings of the 2012 Nanotechnology Conference and Trade Show*, Nanotech 2012 Santa Clara, CA, USA; Christopher C. Evans,

Prasad, R.C., Bhandakkar, Ajit, Sastry, Shankar
"Effect of Fly Ash Addition on the Mechanical Properties and Fracture Toughness of Epoxy Resin and Epoxy Glass Fiber Laminate Composite", *International Conference & Expo on Corrosion, CORCON 2011*, Hotel Intercontinental, Mumbai, 2011.

Raja, V. S.
"High Temperature Corrosion Problems in Designing Graded Thermal Barrier Coatings", *18th International Corrosion Congress,* November 20 - 24 2011, Perth, Australia.

Mukhopadhyay, A.
"Sintering," *Powder Metallurgy Short Course 2012*, held during March 15-18, 2012, at IIT Bombay, India.

"Correlation between Electrochemical Behavior and Stress Development in Graphitic Carbon Thin Film Electrodes for Li-ion batteries," (co-authors: Hurt, R., Xiao, X. and Sheldon, B. W.); *National Metallurgists' Day and Annual Technical Meeting*, held during November 13-16, 2011, at Hyderabad, India.

Gururajan, M.P.
"Spectral Techniques for Studying ATG Instabilities", *National Workshop on Wavelets, Multiresolution and Multifractal analyses in Earth, Ocean and Atmospheric Science*, Department of Earth Sciences, IIT-B, 29 February, 2012 to 2 March, 2012.

Mahender, C., Sumangala, T.P., Venkataramani, N., Shiva Prasad
"Synthesis of Nano crystalline $Ni_{1-x}Zn_xFe_2O_4$ by Sol-gel Auto Combustion Process, Observation Of Structural and Magnetic Properties at Different Sinc Concentration(x) And Preparation of Its Thick Film", *International Conference on Advances in Materials and Materials Processing (ICAMMP 2011)*, Dec 09-11, 2011.

Mahender, C., Sumangala, T.P., Venkataramani, N., Shiva Prasad
"Structural and Magnetic Properties of Rapidly Synthesized Nano Crystalline $Ni_{1-x}Zn_xFe_2O_4$ (with x=0.1- 0.4)", *International Conference on Nano*

Science and Technology (ICONSAT 2012) Jan 20- 23, 2012.

Sahu, B. N., Sahoo, S.C., Venkataramani, N., Shiva Prasad
"Effect of Heat Treatment On Magnetic Properties of Zinc Ferrite Thin Film", *Condensed Matter and Materials Physics Conference (CMMP 2012),* March 03-05,2012.

Sumangala T.P., Mahender, C., Kovid Sonawane, Venkataramani, N.
"Tape casting of Nanosized Spinel Ferrite Powders", *International Conference on Advances in Materials and Materials Processing (ICAMMP 2011)*, Dec 09-11, 2011.

Sumangala T.P., Mahender C. , Venkataramani N., Prasad S.
"Dependence of Cation Distribution on Particle Size in Spinel Ferrites", *International Conference on Nano Science and Technology, ICONSAT 2012*, Jan 20- 23, 2012.

Gurudatt R., Udayan G., Venkataramani N.
"Synthesis and Deposition of PCMO Thin Films on Silicon for Memory Devices, DAE BRNS", *6th National Symposium on Pulsed Laser Deposition of Thin Films and Nanostructured Materials"* (PLD-2011), November 9 - 11 , 2011.

Conference/Workshop (Coordinated/ Chaired by Faculty)

Samajdar, I.
Convener, ICOTOM 16
The *16th International Conference On The Texture of Materials*, during Dec. 201, IIT Bombay.

Parida, S.
Chaired the session on "Powder Coatings", Engg Coat-2012: *Conference on Engineering Coatings Process, Controls & Applications* , February 9 – 11, 2012, IIT Bombay, India.

Invited Lectures

Dusane, R.O.
Kenote address at the *National Conference on Advances in Materials,* Vivekanand College of Science, Mumbai

Prabhu, N.
"Imaging in a Transmission Electron Microscope", *Continuing Education Programme (CEP) Course on Testing and Characterization of Materials*, Naval Materials Research Laboratory, Ambernath, Thane, December 14, 2011

"Real Space to Reciprocal Space", *Workshop on Electron Microscopy*, SAIF/CRNTS, IIT Bombay, April 25, 2011.

Gururajan, M.P.
"Phase field Modelling – Basics: Microstructure, materials thermodynamics and Transformation Kinetics", *CEP Programme in DMRL*, Hyderabad from 5 December, 2011 to 9 December, 2011.

Prita Pant
"Microstructure 2011: Microstructure Across Length Scales" at IITR (IIT Roorkee).

"Workshop on Mechanical Behaviour of Systems at Small Length Scales"(organised by Hysitron Nanotechnology India) in Trivandrum.

"Materials for Energy" at the FAN Meeting at Boston, USA.

Bahadur, D.
"Warm Treat to Cancer With Drug" at the *National Symposium on Nanotechnology Present Perspective and Future Direction*, Patna, April 9-10, 2011.

"A Warm Treatment for Cancer With Drugs", *ICPC Nanonet seminar on Nanomaterials for Biological Applications*, Bangalore, April 14, 2011.

"Hyperthermia and Triggered Drug Release for Cancer Through Magnetic Hybrids and Nano Particulates", *Seminar on Nanotechnology and its Applications*, BARC Mumbai, May 2011.

"Magnetic Nanoparticles for Cancer Therapy", during *SSI Symposium on Social Responsibilities of Learned Professional Societies*, Mumbai, May19-20, 2011.

"Collidal Suspension for Stimuli Response Drug", *International Colloid and Surface Science Symposium* (UK Collids 2011), UK, London, July 4-6, 2011 (A Keynote Speaker).

"Nano Structures and Hybrids for Drug Delivery and Cancer Therapy", *International Conference on Biomaterials and Implants Prospects and Possibilities in the New Millennium (BIO 2011)*, July 21-23, 2011.

"Development of Surface Engineered Oxide Semiconductor and Nanoparticles and their Nanocomposites for Water Purification", at the *INDIA-UK Discussion Meeting on Advanced Technologies for Water and Energy* at the Indian Institute of Technology Madras, Chennai, October 16-18, 2011.

"A Warm Treatment to Cancer and Stimulant for Drug Delivery", in the *Conference on Smart Nano Materials at the Australia-India Joint Symposium*, RMIT

University, Melbourne, Australia, November 2-4, 2011 (A Keynote Speaker).

"Magnetic Nanohydrogel for Some Biomedical Applications" at the *International Conference on Nanoscience, Engineering & Technology (ICONSET 2011)*, organized by Centre for Nanoscience & Nanotechnology at Sathyabhama University, India, November 28-30, 2011.

"Magnetic Hydrogel and Hybrids for Drug Delivery and Cancer Therapy" at *DAE–BRNS National Workshop on Materials Chemistry (Functional Materials),* organized by Society for Materials Chemistry, India, BARC at BARC, Trombay, Mumbai, India, December 7-8, 2011.

"Attacking Cancer through Heat and Drug" at *Nagpur National Conference on Emerging Trends in Nanoscience & Nanotechnology,* Rajiv Gandhi College of Engineering and Research, Nagpur, India, December 20-21, 2011.

"Temperature and pH Sensitive Nanohybrids for In Vitro and In Vivo Studies Towards Cancer Therapy", *International Conference on Nano Science and Technology 2012 (ICONSAT2012)*, Hyderabad, India, January 20 to 23, 2012.

"Oxides and Hybrids at Nanoscale for Cancer Theranostics" at *NANOBIO 2012 Second International Conference on Nanotechnology at the Biomedical Interface*, Amrita Centre for Nanosciences and Molecular Medicine, Kochi, Kerala, India, February 21-23, 2012.

Significant Awards/Distinctions

Dusane R. O.
"Award for Significant Contributions to the Metallurgical Society," given by Indian Institute of Metals, Baroda Chapter.

Mukhopadhyay, A.
Awarded for "Best Oral Presentation" at NMD ATM 2011, Hyderabad, India, on November, 2011.

Bahadur, D.
"MRSI-ICSC Award for Outstanding Contribution to the Field of Materials Science", MRSI-AGM, Bhopal, 2011.

Theme Editor for *A Special Issue of Advanced Drug Delivery Reviews* (Impact Factor~ 13.6), Hybrid Nanostructures for Diagnostics and Therapeutics, November 2011; Member of the Council of Mater. Res. Society of India, 2011; Member of the Editorial Advisory Board of the Bull. of Mater. Sci., 2011; Member of Editorial Board Of Chinese Journal Of Clinicians, 2011; Member of Editorial Board, ICFAI University Journal of Nanotechnology; Member of Project Advisory Committee of DST on Materials, Mining and Mineral Engineering, 2011; Member of DAE XI Plan Committee on Specialist Group on Materials, 2011; and Member of DAE XII Plan Committee on Specialist Group on Materials, 2012.

Honorary Work

Dusane, R.O.
Reviewer: Jour. Non –Crystalline Solids, Thin Solid Films, Applied Surface Science
Editorial Board: The Open Surface Science Journal, Bentham Science Publications

Om Prakash
Reviewed papers for Indian Journal of Engineering and Materials Science.

Gururajan, M.P.
Reviewed papers for Nanomaterials and Energy (ICE journal) and Journal of Materials Engineering and Performance (ASM International MIS journal).

Parida, S.
Reviewed paper for *Applied Nanoscience*, Springer, February 2012.

Faculty Members and Their Specialisation

1. **D. Bahadur**
   Magnetic materials, Electronic ceramics, Nano structured materials for magnetic, Bio and optical applications, Cancer theranostics, Water purification, nano hybrids

2. **N.B. Ballal**
   Process analysis, iron & steel making, Process modelling, Transport phenomena, Thermodynamics.

3. **S. Basu**
   Thermodynmics of metal refining, slag-metal interactions, continuous
   casting

4. **Bhargava P**
   Powder processing, Near net shape forming of advanced ceramics, Indentation fracture of ceramics, Gel casting, Rheology of ceramic suspensions, Fabrication and properties of ceramic foams, Synthesis of oxide nanoparticles, Consolidation of nanoparticles, Farbrication of ceramics for prosthodontic applications, Plastic forming of ceramics, Materials for dye sensitized solar cells.

5. **Arup R. Bhattacharyya**
Polymer blends, Carbon nano tubes/polymer composites, Polymer crystallization, Polymer processing, Nanocomposites.

6. **R.O. Dusane**
Thin films and devices of elemental semiconductors and their alloys, Surface nano-engineering, Photovoltaic devices, MEMS materials and technology, Devices for health care monitoring and radiation detection, Nano wires and nano layers for different applications, Energy storage and functional materials.

7. **P. Gopalan**
Ferroelectric materials and films, SOFC systems, Oxygen ion conductors for SOFC.

8. **Dipti Gupta**
Plastic/flexible electronics based on organic semiconductors, Metal oxides and graphene, key devices and solar cells, Thin film transistors, Memories, Device Physics & simulation.

9. **Gururajan .P.**
Phase transformations, modeling of micro structural evolution, Phase field modeling materials mechanics, materials thermodynamics.

10. **B.P. Kashyap**
Deformation behviour and microstructural evolution.

11. **N.K. Khosla**
Process Instrumentation and control, Mineral processing, Extractive metallurgy, Materials preparation and characterization.

12. **A.R. Kulkarni**
Ionically conducting materials, Lithium batteries, Sensors, Glass and glass ceramics, Impedance spectroscopy, Nanophosphers, Lead free piezoelectrics

13. **A.S. Khanna**
High temperature corrosion, High temperature coatings, Paint coatings, Rebar & concrete coatings, Oil & gas corrosion, Surface engineering.

14. **S. Mallick**
Dielectrics, Powder metallurgy, Dye sensitized solar cells

15. **A. Mukhopadhyay**
Nanomaterials for energy storage & conversion, Stress in thin films, Carbon nanotube reinforced composite, Ceramic nanocomposites.

16. **K. Narasimhan**
Metal forming, Mechanical behavior, Simulation and validation.

17. **Prita Pant**
Mechanical behavior of thin films, Dislocation dynamics simulation, Shape memory materials, Nanoindentation, Twinning.

18. **A.S. Panwar**
Computational materials science, Molecular Simulations, Soft nano-structure materials.

19. **S. Parida**
Electrochemical nanostructuring, Nanoporous materials, Functional application of nano materials, Corrosion.

20. **N. Prabhu**
Physical metallurgy, Phase transformations, Electron microscopy, Structure-property relationships.

21. **Om Prakash**
Electronic ceramics and nano powders: Design, processing and characterization.

22. **R.C. Prasad**
Fatigue, Fracture, Fractography and failure analysis, Environment assisted cracking, Composites, NDE Heat treatment, Fracture mechanics and integrity assessment.

23. **T.R.S. Prasanna**
Materials for energy generation and storage, Oxide ion and cation solid electrolytes

24. **Raja V.S.**
Corrosion, Structure property correlation on corrosion, Failure analysis, Protective coatings, Metallurgy of corrosion.

25. **I. Samajdar**
Thermomechanical processing, Texture analysis Microscopy

26. **S. Saxena**
Computational materials science, Ab-initio calculations

27. **Shobha Shukla**
Nanophotonics, Nanomaterials, Metamaterials, Plasmonics, Photonic crystals.

28. **R.S. Srinivasa**
Nanostructured materials, Thin films.

29. **N. Venkataramani**
Magnetic materials, thin films, structure property correlations in nanocrystalline systems, magneto electric composites

30. **N.N.Viswanathan**
Transport phenomena, Modelling of materials processing, Iron and steel making.

31. **S. Vitta**
Nanomaterials, Magnetic and electrical properties of metals, Alloys & oxides, Thermoelectric materials.

Physics

Introduction

The Department of Physics offers a four-year B.Tech programme in Engineering Physics and a two-year post-B.Sc. programme leading to Master's degree in Physics. Keeping in line with the national science initiative on nanomaterials and nanotechnology, the department started a five-year dual degree programme leading to B.Tech. and M.Tech. degrees in Engineering Physics with specialization in nanotechnology and nanomaterials a few years back. To strengthen our scientific manpower, the department had also started a post-B.Sc. dual degree programme leading to a Master of Science degree in Physics as well as a Ph.D. This programme certainly attracts young and motivated college students. This is in addition to the regular Ph.D. programme. The department along with the Department of Metallurgical Engineering and Materials Science is starting a dual degree programme leading to M.Sc. in Physics and M.Tech. in Materials Science from July 2012. It is a first interdisciplinary programme jointly run by two departments.

At present the department has 31 permanent faculty members. Two new faculty members joined the department during the year. They are: Prof. Sadhna Das and Prof. Kumar Rao

The department has received a FIST proposal worth Rs.5 crores to start research in ultrafast spectroscopy. In order to enhance the department's capabilities to produce samples, which cannot be produced anywhere in the country, it has obtained funds from FIST to buy a high temperature high pressure furnace. A high resolution X-ray system has also been proposed to further characterize the samples that the faculty members are making. Over the last decade, it has become increasingly important for the department to have a device fabrication facility alongside the more traditional material preparation and characterization. Indeed, this is now true for any place in the world with a strong programme in experimental physics. A university R&D level cleanroom is an essential facility not only for semiconductor physicists who work with quantum dots, point contacts, nanowires, quantum Hall physics etc., but also for those working with particle detectors, plasmonic devices, microfluidics, soft matter and lab-on-a-chip type of medical diagnostic tools, etc. Apart from research activity, the department feels the need to impart some hands-on training to our M.Tech. students on basic optical lithography. Our ability to attract young experimentalists (as potential faculty members) also depends crucially on the infrastructure for doing experiments that we can provide at the departmental level.

Academic Programmes

The department offers a wide range of courses (from Bio Physics to Theoretical Physics) for all the programmes thereby helping 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. All the programmes run by the department are highly successful and attract the best students from all over the country through JEE/JAM/GATE. In addition, the department has a vibrant research programme. Annually, the department offers admissions to about 30 students in B.Tech. (Engineering Phyiscs) programme, 10 in dual degree B.Tech.-M.Tech. programm, and 35 students in Master's degree programme. In the dual degree M.Sc.-Ph.D. programme admission was offered to seven students, with stipend given to them from first semester onwards. There are about 71 Ph.D. students and four Post-Doctoral fellows pursuing research in various areas in the department.

Student Intake		
B.Tech.	:	29
B.Tech.+M.Tech. (Dual Degree)	:	12
M.Sc.	:	35
M.Sc.+Ph.D. (Dual Degree)	:	12
Ph.D.	:	12
Degrees awarded		
B.Tech.	:	24
B.Tech.+M.Tech. (Dual Degree)	:	09
M.Sc.	:	32
M.Sc.+Ph.D. (Dual Degree)	:	-
Ph.D.	:	06

The department offers a stipend of Rs. 6000/- to M.Sc.-Ph.D. dual degree students right from the beginning. The research scholars are paid a stipend of Rs. 14000/- for the first two years which is then increased to Rs. 18000/- if they show sufficient progress in their research work.

Under student exchange programme the institute has signed Memoranda of Understanding with NUS Singapore, ETH Zurich and Monash Academy Australia. The students from these institutions often come to the department under this programme. In their feedback, the students have often praised the rigor and depth of our courses.

R&D Activities

The R &D activities of the department can be classified broadly into (1) Experimental and (2) Theoretical. A large number of faculty members are working on various topics in the experimental area. The activities in this area include the development of various materials/devices for applications and also to understand the basic physics in them. The experimental Physics group is involved in activities related to Photonics, Condensed Matter Physics, Spectroscopy, Nuclear and Particle Physics. Work was recently initiated on topics such as nano photonics and spintronics.

The main areas of R&D activity:

(i) Experimental Condensed Matter Physics and Material Science
(ii) Photonics
(iii) Experimental Nuclear Physics
(iv) Theoretical Condensed Matter Physics
(v) Statistical Physics and Non Linear Dynamics
(vi) Theoretical High Energy Physics

Sponsored Research Projects

New Projects	:	9
Ongoing Projects	:	36
Completed Peojects	:	9

Faculty members of the department have brought in about Rs. 300 lakhs through various sponsored and consultancy projects. Most of these projects are supported by agencies such as DST, DAE-BRNS, DRDO, CSIR, ISRO, etc.

List of New And Ongoing Sponsored Projects

Project Title	Agency Name
"Magnetism In Low-Dimensional Strongly corrected Spin Systems Probed Using Nmr/Nqr Spectroscopy"	Department of Science & Technology
"Synchronization Of Coupled Nonlinear Oscillators: Simulations And Experiments"	Department of Science & Technology
"Exotic Magnetic And Electronic Properties In Novel 4d And 5d Transition Metal Oxides"	Department of Science & Technology
"Nano Structured Ni Based Full Heusler Alloys For Magnetic Refrigeration Applications"	Department of Science & Technology
"Goa Comman Entrance Test-2012"	Government of Goa
"Development Of Magnetic Nanocomposite Films And A Prototype Magneto-Optical Sensor"	Indian Space Research Organisation
"Localized Surface Plasmon Resonanace (Lspr) Based Optoelectronic Biosensors"	Naval Materials Research Laboratory
"Systematic Studies On Localized Surface Plasmon Resonance (LSPR) Based Biosensor Using ATR Technique And Its Potential For DNA/Antibody Detection"	Naval Materials Research Laboratory
"An Accelerator School At IIT Bombay"	Tata Institute of Fumdamental Research
High Density Tape Cast Ferrite Thick Films For Microwave Applications	Defence Research & Development Organisation
Enhancement Of Regional World Wide Computing Grid (WLCG)	Department of Science & Technology

Project Title	Agency Name
Optimization Study Of Various Parameters Of Resistive Plate Chamber For India Based Neutrino Observatory	Department of Science & Technology
Microwave Losses In Ferrite Thin Films For Meta-Materials	Department of Science & Technology
Raman Spectroscopy Studies Of Tio2 Thin Films And Nano Tubes/Rods Prepared By Laser Ablation	Department of Science & Technology
Electronics Design Using DSP, FPGA, CPLD And Micro Controllers Through Simulation And Direct Access Of The Hardware	Ministry of Human Resource Development
Proposal For 10Mbps Dedicated Leased Line To IIT Bombay For ALICE WORK	Tata Institute of Fundamental Research
Magnetism In Low-Dimension And/Or Frustrated Magnetic Systems	University Grant Commission

Sponsored Projects completed 2010-11

Project Title	Agency Name
Prototype Development For Optical Fiber Based Pathogen Detection	Naval Materials Research Laboratory
DST/ Review Committee Meeting For Serc School In Theoretical High Energy Physics	Department of Science & Technology
GCET-2011	Government of Goa

Visitors to the Department

Following visitors visited the department and gave seminars:

Speaker	Topic
Prof. Vijay Singh National Coordinator Science Olympiads and NIUS HBCSE (TIFR)	The international physics Olympiads: An Indian success story.
Prof. Vidya Madhavan, Boston College, USA	Stripes in topological insulators
Prof. Eran Rabani Department of Chemistry Tel Aviv University Israel	Multiexciton Generation at the Nanometer Scale
Dr. Satyajit Sahu National Institute for Materials Science Advanced Nano Characterization Unit Tsukuba, Japan	Synchrony-Based Evolution of Microtubule and its Applications
Dr. Manoranjan Kumar Princeton University New Jersey, USA	Frustration Induced Exotic Phases in Axial Anisotropic Spin-1/2 Chain

Speaker	Topic
Dr. Pinkesh Patel Postdoctoral Research Fellow Stanford University	The Effects of Mitochondrial Dynamics on Cellular Physiology
Prof. Andrei Gippius Faculty of Physics Moscow State University, Russia	NMR Study of Low Dimensional Quantum Spin-chain Cuprates
Prof. P. B. Sunil Kumar Physics Department IIT Chennai	Modeling Morphological Changes in Biological Membranes
Dr. Alain PIGNOLET INRS/Université du Québec Centre Énergie Québec J3X 1S2 Canada	Single Phase and Nanocomposite Epitaxial Thin Films and Nanostructures Exhibiting Multiferroic Properties at Room Temperature
Dr. Sanjib Kumar Agarwalla Instituto de Física Corpuscular CSIC-Universitat de Valencia, SPAIN	Neutrino Oscillation Parameters: Current Knowledge and Future Goals
Dr. Dinesh Kabra, Trinity Hall College Cavendish Laboratory, Cambridge UK CB3 0HE	Molecular Semiconductors: Charge Transport, Structural and Spectroscopic based Investigations
Dr. Pinaki Chaudhury Johannes-Guttenberg University Mainz, Germany	Flow of soft jammed materials
Dr. Priya Sony School of Engineering, Brown University, Providence, RI - 02912. USA	Electronic and Dielectric Properties of Two-Dimensional Systems
Prof. R. Shyam Saha Institute of Nuclear Physics, 1/AF Bidhan Nagar, Kolkata 700064	Hadronic and Electromagnetic Interactions as Probes for Strongly interacting matter
Dr. Amit Kumar Agarwal Postdoctoral Researcher (Marie Curie) QTI group, Scuola Normale Superiore Piazza dei Cavalieri n. 7, I-56126, Pisa (Italy)	Collective Excitations in a Strongly Spin-orbit Coupled Two Dimensional Electron Gases
Dr. S. Mahapatra Australian Centre of Excellence for Quantum Computation and Communication Technology, University of New South Wales, Sydney, Australia	Spin Quantum Computing with P Donors in Si: Progress and Challenges
Dr. Mishkatul BhattacharyaDepartment of PhysicsRochester Insitute of TechnolgoyRochester, NY, USA	Level Crossing Study of Polar Paramagnetic Molecules in Crossed Electric and Magnetic Fields
Mr. Kunj Prasad Texas A&M university	Dark Matter and Search Techniques
Professor R. N. Bhatt Department of Electrical Engineering & Princeton Center for Theoretical Science Princeton University	Magnetic Physics in Doped Semiconductors.

Speaker	Topic
Prof. C. Uberoi IISc, Bangalore	Ragas Across Space: A musical journey through the solar system
Prof. Mayank R. Mehta Director, Keck Center for Neurophysics, Associate Professor in the Departments of: Physics & Astronomy, Neurology, Neurobiology	Neurophysics of Space-Time and Brain-Machine Interface
Prof. Sudhir R. Jain Nuclear Physics Division, Van de Graaff Building, Bhabha Atomic Research Centre, Mumbai	A Primer on Quantum Chaos
Dr. Shashank Shekhar University of Central Florida	Solution Processed Ultra-High Density Arrays of Carbon Nanotubes: Alignmnent, Transport Behavior, and Stability to High Electric Field
Prof. P. Jena Physics Department Virginia Commonwealth University	Issues and Challenges in a Hydrogen Economy
Dr. R. Rajesh Institute of Mathematical Sciences, Chennai	Isotropic-Nematic-Disorder Transitions in a System of Long Rods
Prof. T.R. Govindarajan Institute of Mathematical Sciences, Chennai	Novel Blackhole Boundstates
Dawood KothawalaUniversity of New Brunswick,Fredericton, Canada	Horizon Thermodynamics and Emergent Gravity
Dr. Debjani PaulCambridge University	Physics of biological systems on a Chip: Infection Dynamics and Label-free Protein Biosensors
Dr. Ritaban ChatterjeeYale University Yale University	Universality of Black Hole Accretion
Dr. Suchetana Chatterjee Yale University	Cosmological Simulations of Structure Formation: New Frontiersand Future Challenges

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

P. Vasa

International Conference on Fundamental Optical Processes in Semiconductors 2011, Lake Junaluska, North Carolina, USA, 31st July-5th Aug. 2001.

Workshop on recent trends in Nano-photonics, IIT Delhi, 30th Sept-1st Oct. 2011.

National Laser Symposium, Anna University, Chennai 8-12th Jan. 2012

S. S. Major

"Microstructural Studies of Epitaxial ZnO Films Deposited on Sapphire by Reactive RF Magnetron Sputtering", D. Singh, R. Kumar, T. Ganguli, R. S. Srinivasa and S. S. Major, *AIP Conf. Proc*. 1349 (2011) 793–794.

"HRXRD Study of Epitaxial GaN Films Grown on ZnO Buffer Layers by Magnetron Sputtering", P. Mohanta, D. Singh, R. Kumar, T. Ganguli, R. S. Srinivasa and S. S. Major, *AIP Conf. Proc.* 1349 (2011) 675–676.

"Effect of Buffer Layer Growth Temperature on Epitaxial GaN Films Deposited by Magnetron Sputtering", P. Mohanta, D. Singh, R. Kumar, T. Ganguli, R. S. Srinivasa and S. S. Major, Poster presentation, *56th DAE Solid State Physics Symposium 2011*, SRM University, Kattankulathur, Tamilnadu

"Effect of Substrate Temperature on Microstructure of Epitaxial ZnO Films Grown on Sapphire by Sputtering", D. Singh, R. Kumar, Tapas Ganguli, R.S. Srinivasa and S.S. Major, Poster presentation, *56th DAE Solid State Physics Symposium 2011,* SRM University, Kattankulathur, Tamilnadu.

"GO and RGO Based FETs Fabricated With Langmuir-Blodgett Grown Monolayers", V. Divakar Botcha, Gulbagh Singh, Pavan K. Narayanam, D. S. Sutar, S. S. Talwar, R. S. Srinivasa and S. S. Major, [Poster presentation], *56th DAE Solid State Physics*

Symposium 2011, SRM University, Kattankulathur, Tamilnadu.

"Reduction of Graphene oxide Monolayers Transferred on Si and Ti Substrates by LB Technique", Gulbagh

Singh, V. Divakar Botcha, Pavan K. Narayanam, D. S. Sutar, S. S. Talwar, R. S. Srinivasa and S. S. Major, [Poster presentation], *56th DAE Solid State Physics Symposium 2011,* SRM University, Kattankulathur, Tamilnadu.

Behera, H. and Mukhopadhyay, G.
"A Comparative Computational Study of the Electronic Properties of Planar and Buckled Silicone", *WNNM-2012,* January 20-21, 2012", Bhubaneswar, Odisha; Arxiv preprint arXiv:1201.1164.

Mukhopadhyay, G.
"Inaugural Talk on New and NanoMaterials", *Workshop on New and Nano Materials (WNNM)-2012*, held during January 20-21, 2012 at Bhubaneswar, Odisha.

Ramdevi
"Chern-Simons Theory and Topological Strings,"at *String Theory and Cosmology Workshop*, held at Busan, South Korea (June 2011).

Conferences/Symposia/Workshops/ Seminars (Coordinated/Chaired by Faculty)

Mukhopadhyay, G.
Chaired a session on "Day-3, Session VIII, Invited talks on January 22", *International Workshop on functional Materials (IWMF-2011)*, held during December 20-22, 2011 at Gopalpur, Berhampore, Odisha.

Was invited to Isaac Newton Institute, Cambridge, UK during January 2011, to chair a session in the *M-Theory Conference.*

Shiva Prasad
Joined the delegation and attended the India-Yale Academic Leadership Program from September 25, 2011 to 8th October 2011.

Invited Lectures

P. Vasa
"Ultrafast plasmonics in the Workshop on Recent Trends in Nano-photonics", IIT Delhi, 30th Sept-1st Oct. 2011

"Active plasmonics in the National Laser Symposium", Anna University, Chennai 8-12th Jan. 2012

A. V. Mahajan
"NMR: A local probe of Magnetism in Materials", Colloquium at IIT Kanpur, Jan 2012.

A. Sain
"An Interdisciplinary Approach to Soft Matter & Biological Physics", 2-3 Dec,2012: IACS, Kolkata & SINP, Kolkata.

"Dynamics of Phase Transformations", 28-30 Nov, 2011, JNCASR, Bangalore

Shiva Prasad
Gave an invited talk in the *International conference on Materials for Advanced Technologies*, which was held in Suntec, Singapore from June 26- July 1, 2011. I also presented a contributed paper in the same conference and chaired a session.

M. Senthil Kumar
"Magnetic and Magnetotransport Properties of Metallic Multilayers", *Indian Vacuum Society Symposium on Thin Film Science and Technology*, Mumbai, Nov. 9-12, 2011

"Nanostructured magnetic multilayers", *International Conference on Nanomaterials: Synthesis, Characterization and Applications*, Kottayam, Jan 12-15, 2012

Mukhopadhyay, G.
"Emerging Two-dimensional Materials: Graphene and its Other Structural Analogues", *WNNM-2012*, held during January 20-21, 2012 at Bhubaneswar, Odisha.

Significant Awards/Distinctions

P.Vasa
Selected to visit Germany under Indian National Science Academy (INSA) Researcher Exchange/ Collaborative Programme

Honorary Work

Mukhopadhyay, G.
Serving as Member of the Editorial board for Research & Reviews : Journal of Physics (RRJoPHY), STM Journals, Division of Consortium eLearning Network Pvt. Ltd. A-105 IIIrd Floor, Sector-63, Noida - 201 301 (U.P.) Serving as Member of the Editorial board for PHYSICS EDUCATION, a Quarterly e-Journal devoted to Physics Pedagogy, Supported by The Board of Research in Nuclear Sciences (BRNS), Department of atomic Energy, Govt. of India; University of Pune, Pune and IISER, Pune.

P.Vasa
Member, Academic team, International Junior Science Olympiad 2013

Faculty Members and their Specializations

1. **Dipan K. Ghosh**
   Theoretical condensed matter physics, Exactly solvable models in Magnetism
2. **Gautam Mukhopadhyay**
   Theoretical condensed matter physics, Magnetism & magnetic materials, Nano scale physics, Statistical physics, Non-equilibrium physics
3. **Shiva Prasad**
   Magnetism and magnetic materials, Nano scale physics, Thin films and multilayers

4. **S.S. Major**
Nanomaterials (semiconductors/carbon based materials), Nano scale physics, Thin films and multilayers

5. **Bhanu P. Singh**
Nano scale physics- Experimental Laser physics and spectroscopy, Non-linear optics

6. **Urjit A. Yajnik**
Theoretical high energy physics, Non-equilibrium physics, Applications of quantum physics

7. **D.S. Misra**
Nanomaterials (semiconductors/carbon based materials), Nano scale physics, Thin films and multilayers

8. **Raghava Varma**
Experimental nuclear physics, Relativistic heavy-ion physics

9. **S. Umasankar**
Theoretical high energy physics

10. **Tapanendu Kundu**
Experimental, Laser physics and spectroscopy, Non-linear optics

11. **Prabhakar .P. Singh**
Theoretical condensed matter physics

12. **R.Vijaya**
Experimental laser physics and spectroscopy, Non-linear optics

13. **C.V. Tomy**
Magnetism and magnetic materials, Superconductivity and low temperature physics

14. **Alok Shukla**
Theoretical condensed matter physics

15. **Avinash V. Mahajan**
Magnetism and magnetic materials, Superconductivity and low temperature physics

16. **K.G. Suresh**
Magnetism and magnetic materials

17. **M. Senthil Kumar**
Magnetism and magnetic materials, Nano scale physics, Thin films and multilayers

18. **Pragya Das**
Experimental nuclear physics

19. **N. Nambudiripad**
Magnetism and magnetic materials, Superconductivity and low temperature physics

20. **P. Ramadevi**
Theoretical high energy physics

21. **Punit Parmananda**
Non-linear dynamics, Non-equilibrium physics

22. **Dibyendu Das**
Statistical physics, Non-equilibrium physics

23. **Basanta Kumar Nandi**
Experimental nuclear physics, Relativistic heavy-ion physics

24. **Asmita Mukherjee**
The oretical high energy physics

25. **Anirban Sain**
Statistical physics, Non-equilibrium physics

26. **Subhabrata Dhar**
Nanomaterials (semiconductors/carbon based materials), Magnetism and magnetic materials, Thin films & multilayer growth processes, Experimental Laser physics and spectroscopy

27. **Aslam Mohamad**
Nanomaterials (semiconductors/carbon based materials), Magnetism and magnetic materials, Nano scale physics

28. **Tathagat.A. Tulsi**
Quantum computing

29. **Pradip Sarin**
Experimental nuclear physics

30. **Kantimay Das Gupta**
Low temperature transport in semiconductor heterostructures and bi-layers, Probing electronic interaction by Coulomb drag method, Vortex phases in superconducting thin films.

31. **Parinda Vasa**
Optical and Near-field spectroscopy, Optical properties of semiconductors nanoparticles

32. **Sadhana Das**
Experimental Nuclear & High Energy Physics

33. **Kumar Rao**
High Energy Physics

34. **Kailash C. Rustagi**
Nanomaterials (semiconductors/carbon based materials), Nonlinear optics, Theoretical condensed matter physics

35. **S.H. Patil**
Theoretical physics, elementary particles, quantum mechanics and applications to atoms, molecules, and nuclei

36. **Yogesh K. Gambhir**
Conventional Nuclear Physics.
High Spin States and Super-deformations.
Exotic Nuclei and Neutron Halos.
Relativistic Mean Field for Finite Nuclei (Structure and Reactions.)
Equation of State, Nuclear Matter Under Extreme Conditions and Very Dilute Neutron Matter in Practically Proton Free Environment

37. **S.N. Bhatia**
Magnetic phase transitions in Oxides and other low dimensional systems.
Thermal fluctuations in High T_c Superconductors.
Thermoelectric Devices for Energy conversions.

Shailesh J. Mehta School of Management

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 currently has 22 full-time faculty, two distinguished guest professors and six adjunct faculty. One new faculty named Prof. T. T. Niranjan joined the school this year. The school infrastructure was augmented considerably. All the classes in the school have been air-conditioned.

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. programmes to develop future cutting-edge researchers. The school has started B.Tech. Minor in Management from 2008. In the 2011-2012, the school awarded both Master of Management and Ph.D. degrees as shown in the following table.

Degrees Awarded		
M.Mgt.	:	94
Ph.D.	:	11

The total number of scholarships awarded in 2011-12 for Master of Management programme is 41. The total number of scholarships awarded in 2011-12 for the Ph.D. programme is 16, including two Shailesh J Mehta Endowment Scholarship, one AICTE National Doctoral Fellowship, four IRCC Partial Financial Support, one UGC Junior Research Fellowship.

Campus placement for the batch 2010-2012 was conducted in the Spring 2012 semester and all the students have now been placed. The table below summarises this year's placement statistics for the Master of Management programme.

Number of recruiters	71
Average Annual Compensation	13.72 L
Highest Annual Compensation	21.5 L
Total Number of Offers	140
Average Number of Offers per Student	1.19
Median Annual Compensation	13.07 L
Lowest Annual Compensation	7 L

R&D Activities

Sponsored Research Projects

Sponsored Research Projects	**:**	**24**
New	:	Nil
Ongoing	:	13
Completed	:	11
Faculty Involved	**:**	**06**

Completed Projects

"Research and Training in Supply Chain Management" by SISL

"Responding to S&T Co-operation with India: A Study on Innovation Policies, Support Structures and Training Programmes in India, leading to a Cross-border Innovation Platform Strategy to Promote EU-India Partnerships in S&T" by European Commission

"Drivers for Technological Innovation in National Innovation System" by MHRD

"A Preliminary survey of Technology Management Practices" by IRCC

"Establishment of IPR Depository" by MHRD.

"Techno-economic Marketing Assessment and Planning for Ceramics in India (This project was done during FDP programme in Ahmedabad)" by TIFAC, DST

"Research and Training in Technology Management" by TMD, DSIR

"Workshop on Patent Drafting" by MHRD

"Workshop on Institutional Intellectual Property Management" by MHRD

"Research and Training in Technology Management" by TMD, DSIR

"Developing Production Planning and Control System for Pharmaceutical Industry" by Alembic Chemicals Ltd.

Ongoing Projects

"Accelerating Industrial Competitiveness through Innovation" by IITB, IRCC

"Working on a Sub-project Focusing on 'Technological capabilities' of bigger 'Systems and Modules'" by MNRE, IITB, NCPRE

"Financial Inclusion - Status and its Impact on Human Development: A Special Focus on North East India" by IRCC, IITB

"Fuzzy Decision-making Approach to Production-inventory Problems in the Context of Supply Chain Management" by IRCC

"Capacity Creation in IP Education and Research" by IP Chair, MHRD

"Research and Training in Technology Management" by TMD, DSIR

"Collaborative activities in the Area of Entrepreneurship: National Network Project" by Wadhwani Foundation–Indo US Collaboration

"Development of Decision Support System for Project Scheduling Using Meta-Heuristics (R&D)" by MHRD

"Technology-gap in Indian Industries – Analysis in the post-1991 Era" by IRCC

"Simultaneous Optimization of Mean and Variance for Multiple Response Problems" by DST

"Spiritual Climate of Business Organizations and its Impact on Employees Engagement and Learning and Innovation in Teams" by Seed Grant

Consultancy Projects

SJMSOM undertook six consultancy projects during the year wherein four faculty members were involved. The revenue generated out of these projects was Rs.2109408/-.

Extension Activities

"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 business and academia. Each of these seminars focuses on 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.

"Marketing Continuum" was conducted on 30th July 2011. It was organized by "Marktrix" - the Marketing club of SJMSOM, IIT Bombay. The theme of the "Continuum 2011" revolves around the customer centric approach of a marketer. The event hosted Marketing *gurus* in various domains to lecture on the theme: "Marry Your Customers: From Acquisition to Retention". Several senior industry personnel spoke at the event.

"Finance Continuum 2011" was organized on 31st July 2011 with a theme reflecting the current trends and challenges faced by finance professionals. The theme of the Finance Continuum 2011 was based on the theme: "Financing this decade for growth and sustainability". Several senior personnel from industry personnel spoke at the event.

"Systems Continuum 2011" was held on 17th September 2011 and was based on the theme: "Strategic Role of IT in Transforming Businesses". The event was graced by the presence of several luminaries from industry.

"Operations Continuum 2011" was organized on 18th September, 2011, with a theme that reflects the current trends and challenges facing the industries in operations. The "Operations Continuum 2011" conducted a series of lectures and panel discussions centred on the theme: "Strategies for a Global Supply Chain". Several distinguished people from industry spoke at the event.

"Consulting Continuum 2012" was the second event in Continuum 2012 series. It was organized on 25th March 2012 with a theme reflecting the current trends and challenges facing the consultants. A series of lectures and panel discussions centered on the theme: "Sustainability Spawning New Standards" was conducted and delegates from several organisations spoke at the event.

"HR Continuum 2012" was held on 24th March 2012 was a daylong event based around the theme: "Business Excellence Through Innovative HR Practices". Eminent personalities from industry spoke at the event.

The following are the Management Development programmes conducted through Continuing Education and Quality Improvement Programme, IIT Bombay:

Sr. No.	Title of the programme	Coordinator(s)	Starting date of the programme
1	"Certificate Programme In Marketing and Human Resource Management" (Batch 8)	Prof. S. Bhargava / Prof. Dinehs Sharma	23rd July 2011
2	"Corporate Social Responsibility (CSR) to the CSR Professionals working in the Corporates"	Prof. Ashish Pandey	9th September 2011
3	"Leveraging R&D and Engineering for Competitive Advantage", TMTC, Pune	Prof. K. Momaya & Prof. Karuna Jain	22nd September 2011
4	"Advance Programme in Business Analytics" (Batch 2)	Prof. Usha Ananthakumar	21st October 2011
5	"General Management Programme for Technical Professionals" (Batch-4)	Prof. Karuna Jain	22nd January 2012
6	"Building Organization and Managing People for Strategic Advantage for National Entrepreneurship Network (NEN)"	Prof. Ashish Pandey	19th January 2012

Visitors to the Department

Prof. Nagesh N. Murthy from Lundquist College of Business, University of Oregon, Eugene. He delivered a lecture on "Integrating Product Platform Development with Supply Chain Configuration: Implications for Mass Customization".

Dr. Prasenjit from University of Manchester, UK, on 2nd August 2011. He delivered a lecture on "Material Interests, Moral Reputation, and Crowding Out Species Protection on Private Land".

Dr. Malay Dey, Associate Professor of Finance at NYIT, on 23rd August 2011. He delivered a lecture on "Corporate Finance and Valuation, Relation between Product Market and Firm Valuation".

Prof. Asoo Vakharia, the McLatchy Professor and Director of the Center for Supply Chain Management in the Warrington College of Business Administration at the University of Florida. He delivered a lecture on "Wholesale Pricing in Decentralized Supply Chains: The case of uniform vs. retailer-specific pricing".

Prof. Suresh Sethi, Eugene McDermott Chair of Operations Management Director, Center for Intelligent Supply Networks (C4iSN), School of Management, The University of Texas at Dallas. He delivered a lecture on "Cooperative Advertising in a Dynamic Retail Market Duopoly".

Ms. Waltraut Ritter is Research Director of Knowledge Dialogues which she founded in Hong Kong in 1997. She delivered a lecture on "Creating Economic Value and Innovation through Open Government Data."

Prof. Shailesh Kulkarni, University of North Texas, visited the school and delivered a lecture on "Using Innovative Teaching Methods to Enhance Active Learning and Student Performance in Operations and Decision Sciences".

Prof. Uday Karmakar, UCLA. He delivered a lecture on "Global Competition, Technology Management and the Prospects for India".

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

Dutta, P.

Workshop on *CARISMA-IIM Calcutta – Optimization Methods & Risk Analysis: Applications in Finance* - held during April 6-9, 2011, at the Indian Institute of Management Calcutta, Kolkata, India.

"Integrated Reverse Logistics: A Study of Bullwhip Effect Using Simulation", *International Conference on*

Operations Research for Sustainable Development in Globalized Environment, organized by Operation Research Society of India, held during January 06-08, 2012 at Kolkata, India.

Das, D. and Dutta, P.
"A Comparative Study of Bullwhip Effect in a Multi-Echelon Forward-Reverse Supply Chain", *The Pyrenees International Workshop on Statistics, Probability and Operations Research, SPO 2011*, held during September 13-16, 2011 at Jaca, Spain.

Nagare, M. and Dutta, P.
"Study of Customer Response to Retail Stockout and its Impact on Product Assortment", *International Conference on Operations Research for Sustainable Development in Globalized Environment*, organized by Operation Research Society of India, held during January 06-08, 2012 at Kolkata, India.

Jain, K.
42nd Annual Meeting and Conference of DSI, held during November 19 - 22, 2011, at Boston Marriott Copley Place, Boston, Massachusetts, USA.

POMS 2011 Conference on "Operations Management - The Enabling Link conference" held during April 29 – May 2, 2011, at Peppermill, Reno, USA.

Swaminathan , Balachander and Jain, K.
"Implementing the Lean Concepts of Continuous Improvement and Flow on an Agile Software Development Project: An Industrial Case Study", *International Conference on Agile and Lean Software Methods*, held during February 17-19, 2012, at Bengaluru.

Mukundan R, Jain, K., Annapoornima M.S.
"Analysing the Cost of Patent Pools through Knowledge Spillovers", *1st International Conference on Management of Intellectual Property and Strategy MIPS 2012*, held during February 2-5, 2012 at IIT Bombay, *Awarded the best student research paper.*

Sanjay Bhardwaj and Jain, K.
"Innovation Paradigms: Contractual Models for Research and Technology Organizations" *1st International Conference on Management of Intellectual Property and Strategy MIPS 2012*, held during February 2-5, 2012 at IIT Bombay, Mumbai.

Suresh, M., Dutta, P. , Jain, K.
"Heuristic Framework for Resource Constrained Multi-project Scheduling Problem with Sequence and Resource Dependent Transfer Times", *5th International Conference on Improving Competitiveness Through Decision Sciences*, held during January 4 -6, 2012, at Great Lakes Institute of Management, Chennai.

Gargate, G. and Jain, K.
Presented paper in absentia "Intellectual Property Management of an Educational Organization with special Emphasis on Human capital: An Indian Experience," *11th Global Conference on Flexible Systems Management*, held during December 9-12, 2011 at IIM Kozhikode, Kerala.

Bilolikar , V. S. and Jain, K.
"Genetic Algorithm for Multimode Resource Constrained Project Scheduling Problem," *DSI Conference*, held during November 19 - 22, 2011, at Boston Marriott Copley Place, Boston, Massachusetts, USA.

Joshi, K. and Jain, K.
"Resource Constrained Project Scheduling with Learning Effect," *DSI Conference*, held during November 19 - 22, 2011, at Boston Marriott Copley Place, Boston, Massachusetts, USA.

Sekhar, P K., Raj Mohan, M., Sharma S., Udayrajan, V., Mukundan R., Momaya, K.and Jain, K.
"Aligning Technology Licensing Strategies and Business Competitiveness: A case of photovoltaic technology firms in India," *PICMET 2011*, held during July 31 - August 4, 2011, Hilton Portland and Executive Tower, Portland, Oregon, USA.

Jain, K. and Gupta, R.
"What Drives Mobile Telephony Diffusion in Rural India? An Empirical Analysis Technology Management," *POMS 2011*, held during April 29 - May 2, 2011, at Peppermill, Reno, USA.

Jain, K. and Lakal, N.
"Application of Lean to Enhance Service Quality: A Framework Service Operations," *POMS2011*, held during April 29 - May 2, 2011, at Peppermill, Reno, USA.

Mukundan R., Jain, K., Jha, S.K.
"Overcoming the Tragedies and Comedies: Integrating the nature of commons with the technology strategy of a firm", *3rd IIM Bangalore Doctoral Research Conference cum Journal Competition*, held at IIM Bangalore IMR November 2011, IIMB Management Review.

Kathuria, V. K. , Rajesh Raj S . N. and Sen K.
"Has 1990s Reforms Reduced Manufacturing Dualism in India"at the *National conference on Twenty Years of Economic Reforms and Inclusive Growth in India,* organized by St. Joseph's College, Tiruchirappalli, during February 13-14, 2012.

"The Effects of Economic Reforms on Manufacturing Dualism: Evidence from India" in a *Seminar* at Indira Gandhi Institute of Development Research (Deemed University), Mumbai on September 29, 2011.

"Are Formal Firms More Efficient Than Informal Firms? Evidence from Indian Manufacturing" at the *9th Annual International Industrial Organization Conference*, held at the Boston Plaza in Boston, USA, during April 8-10, 2011.

Kathuria, V. K.
"What Causes Agglomeration? – Policy Infrastructure – A Study of Indian Manufacturing Industry," *VI Annual International Conference of Knowledge Forum on 'Agglomeration, Technology Clusters and Networks,* organized jointly by Forum for Global Knowledge Sharing and Department of Economics, Goa University, during November 18-20, 2011, at International Centre, Goa.

Kathuria, V. K. and Turaga, R.M.
"Small Industry in India: Are CETPs an appropriate response for controlling pollution?" in a *National Workshop on Two Decades of Economic Globalisation in India: How Have Firms and Consumers Responded?,* organized by GIDR Ahmedabad and Sponsored by ESRC UK, held in N. Delhi during April 22-23, 2011.

Mishra, T.
"Linkages between Environment and Globalization: A Case Study of Developing Countries," *Sixth Biennial Conference of the Indian Society for Ecological Economics (INSEE) on Nature, Economy and Society: Understanding the Linkages*, held during October 20-22, 2011, at the Centre for Economic and Social Studies (CESS), Hyderabad.

Presented a poster "Impact of climate Change: A tale of two coastal cities of India', *International Conference on Planet Under Pressure*, held during March 26-29, at Excel, London,UK.

Momaya, K.
"New Perspectives for Industrial Competitiveness: Exploring the Role of IITs", in *GLOGIFT 11, Annual Conference of Global Institute of Flexible Systems Management on Organisational Flexibility and Competitiveness*, held during December 9-12, 2011, at IIM Kozhikode, Kerala.

Niranjan, T. T.
Participant-Centered Learning Workshop, co-organized by Harvard Business School Publishing and Case Research Society of India, held from 13-16 March 2012, at Aircel Academy, Gurgaon.

Pandey, A.
"Application of Appreciative Inquiry Process in Four Distinct Groups: Reflections and Learnings" *Confluence of The Appreciative Inquirers Network*, Banglore, Nov. 4-5, 2011

"Spiritual Climate of Business Organizations and its Impact on Learning in Teams" in *2nd International Conference on Management, Spirituality and Religion,* organized by the Journal of Management Spirituality, held on Jan. 8 to 11, 2012, in the Indian Institute of Management (IIM) Banglore.

Ananthakumar, U. and Paliwal M.
"Comparison of Neural Network and Regression Techniques for Nonlinear Prediction Problems**",** *IEEE International Conference on Industrial Engineering and Engineering Management*, held during December 6-9, 2011, at Singapore.

Jain, B., Adil, G. K. and Ananthakumar, U.
"A Case Study on Four-Stage Model Assessing Strategic Role of Manufacturing", *International Conference on Advances in Supply Chain and Manufacturing Management*, held during 16-18, December 2011 at IIT Kharagpur, India.

Bapat, V. B.
Bapat Varadraj and Raithatha M. (2012), "Ranking of Mutual Fund Performance: Comparison of Various Measures", *International Research Conference on Management, Banking and Finance (IRCMBF) 2012* at Jamnalal Bajaj Institute of Management Studies, Mumbai.

Kalro, A.D., Marathe, R.R., and Thomas, M.A.
"Battle of Equals: Impact of Comparative Advertising on Brand Image," *North American Society for Marketing Education in India International Marketing Conference*, held during 29th and 30th December 2011 at the Great Lakes Institute of Management, Chennai.

Bardhan,K., Mukherjee. I., Kundu, M. (Pal)
"MCEWMA Control Chart to Detect Small Shift for Autocorrelated Water Treatment Process Responses," *IEEE International Conference on Quality and Reliability*, held during September 14-17, 2011, at Bangkok, Thailand.

Kushwaha. S., Mukherjee, I.
"Multiple Response Quality Characteristic Optimization using ACO_R in Mixed Integer State Space", *15th Annual International Conference of the Society of Operations Management* (SOM2011), held during December 16-18, at IIM Kolkata.

Rao, S.N. and Dandale, S.
"Earnings Management: Study of Indian Initial Public Offerings (IPOs) and their Post-Listing Performance", in *41st Annual Conference of Financial Management Association International*, held on 19-22 October 2011 at Denver (USA). [This paper was selected for the Top Ten sessions of the conference (among 75 papers selected from nearly 1300 papers submitted)].

Rao, S.N. and Dhanuka, A.
"Open Market Sharebuybacks: Analysis of Stock Market Performance", in *India Finance Conference 2011*, jointly hosted by IIM Calcutta and IIM Bangalore, held on 21-23 December 2011 at IIM Bangalore, Bangalore

"Open Market Share Buybacks: Analysis of Operating Performance", in *9th International Conference on Business and Finance*, held on 6-7 January 2012 at IBS Hyderabad, Hyderabad

Sonar, R.M.
"Modelling and Automating Business Intelligence Services", *WITS 2011: 21st Annual Workshop on Information Technologies and Systems,* held during December 3-4, 2011 Shanghai, China.

Conferences/Symposia/Workshops/ Seminars (Coordinated/Chaired by Faculty)

Jain, K.
Coordinated the *Research & Academic Conference on Project Management*, "Getting India ready in a Project Driven Economy - Role of Academia", December 9-10, 2011, at the National Institute of Construction Management & Research (NICMAR), Pune

Coordinated the *5th International Conference on improving competitiveness through Decision Sciences, ISDSI 2012*, held during January 4 -6, 2012, at Great Lakes Institute of Management, Chennai

Organized the *1st International Conference on Management of Intellectual Property and Strategy (MIPS),* held during February 2-5, 2012, at Indian Institute of Technology Bombay, Mumbai.

Organized the *2nd Annual Global Conference on Entrepreneurship & Technology Innovation (AGCETI),* held during December 1-3, 2011, at Indian Institute of Technology Bombay, Mumbai.

Organized the *2nd International Conference on Services in Emerging Markets (ICSEM 2011),* held during September 29 – October 1, 2011, at Indian Institute of Technology Bombay, Mumbai.

Organised a *Workshop on Patent Searching and Drafting*, March 29-30, 2012

Organised a *Workshop on Fundamental of IPR*, August – October, 2011

Pandey, A.
Chaired the session on "Leadership Through Experiential Learning " *Seminar on Leadership Development* held on September, 30th, 2011 at S.P. Jain Institute of Management Research, Mumbai.

Patil, R.J.
Conference Co-chair for the *Fifth International Conference on Improving Competitiveness through Decision Sciences* held during 4th to 6th January 2012 at the Great Lakes Institute of Management, Chennai .

Momaya K.
Core member of the organizing committee of *2nd Annual Global Conference on Entrepreneurship & Technology Innovation (AGCETI)*, held during December, 1-3, 2011, at IIT Bombay.

Chaired a session in GLOGIFT 11, *Annual Conference of Global Institute of Flexible Systems Management on Organisational Flexibility and Competitiveness*, held during December, 9-12, 2011 at IIM Kozhikode, Kerala.

Kusre, A.T.
Chaired a session "Impact of the financial crisis on the entrepreneurial landscape" in *2nd Annual Global Conference on Entrepreneurship & Technology Innovation (AGCETI)* held on December 1-3, 2011.

Mishra, T.
Coordinated the *2nd annual Global conference on Entrepreneurship and Technological Innovation (AGCETI)* held on January 1-3 January, 2011, at IIT Bombay

Mukherjee. I.
Organizing Secretary and Programme Chair in the *2nd International Conference on Services in the Emerging Market*, held on September 29, 2011, at IIT Bombay.

Chaired the session on "IT Service," *2nd International Conference on Services in the Emerging Market*, held on September 29, 2011, at IIT Bombay..

Invited Lectures

Kathuria, V. K.
"The Effects of Economic Reforms on Manufacturing Dualism: Evidence from India" (with SN Rajesh Raj and K. Sen) at the *48th Annual Conference of The Indian Econometric Society (TIES)* held at Pondicherry University, Puducherry, during March 1-3, 2012.

"Peer Review Process for Different types of papers" for a faculty consortium on *Publishing for impact,* organized by Magarpatta City Institute of Management & Technology, Pune on Feb. 24, 2012.

Momaya, K.
Plenary address on "Scale-up in Business Competitiveness: Need for New Perspectives & Strategic Flexibility", *in National Seminar on Managing Business Competitiveness Through*

Strategic Flexibility, held at Kautilya Institute of Management & Research, Wagholi, Pune, October, 4, 2011

Mukherjee, I.
"Design of Experiment for Steel Plant," Tata Steel, R &D Division, Jamshedpur, June 2011.

"Statistical Techniques for Management", Tata Steel, R &D Division, Jamshedpur, June 2011.

Pandey, A.
"Corporate Social Responsibility," Rajiv Gandhi Institute of Technology, Mumbai, Oct. 20, 2011.

"Demystifying Research", Learning and OD Roundtable in collaboration with Times Ascent, December, 24, 2011.

"Demystifying Research", Trainers Forum, March 4, 2012

Rao, S.N.
"Innovative Financial Instruments" at SDM Institute of Management, Mangalore (3 Aug 2011).

"Buyback of Shares" at National Institute of Technology Karnataka, Surathkal (29 March 2012)

Sonar, R.M.
"Technical Talk on Modelling and Automating Business Intelligence Services" on 3rd March at *National Seminar on Natural Language Processing and Data Mining (NLPDM)*, held during 3-4 March, 2012, at Surat, India.

Jain, K.
"Supply Chain Relationship in Indian Manufacturing Firms," Wilfrid Laurier University, Waterloo, USA, April 20, 2011

Significant Awards/Distinctions

Jain, K.
MHRD IPR Chair Professor, 2011-14

Member, Sectoral Innovation Council on Intellectual Property Rights under the Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India, 2011-2012

Member, Decision Sciences Institute Board, 2011-2012

Elected Vice President for the Decision Sciences Institute Indian Subcontinent Region (ISDSI), 2011-2012

Vice Chairperson, Project Management Institute – India Academic Advisory, November 2010–November 2011

Member, Academic Advisory Committee, NEN, December 2011–December 2012

President, Indian Subcontinent Decision Sciences Institute, 2008-2010

Kathuria, V. K.
Recipient of "Mahalanobis Memorial Medal-National Award" for the year 2010 in the area of Quantitative Economics

Momaya, K.
Editor in-chief, International Journal of Global Business and Competitiveness (IJGBC)

Patil, R.
Vice President – Long Range Planning – the Indian Subcontinent Region Decision Sciences Institute (ISDSI).

Membership of Scientific Societies/Bodies /Organisations

Pandey, A.
Professional Member of the Appreciative Inquirers Network

Honorary Work

Ananthakumar, U.
Reviewed paper for *Journal of Applied Statistics,* June 2011.

Dutta, P.
Reviewed paper for International Journal "The International Journal of Planning and Scheduling", December, 2011.

Reviewed paper for OPSEARCH, December, 2011.

Kathuria, V. K.
Reviewed the journal of Journal of Cleaner Production

Reviewed the journal of Oxford Development Studies

Reviewed the journal of Review of Urban & Regional Development Studies

Momaya, K.
Reviewed papers for select journals such as Vikalpa, Giftjourn@1, Journal of International Business and Economy (JIBE) and conferences such as PICMET

Mukherjee, I.
Reviewed more than five papers for International Journal of Advanced Manufacturing Technology, Springer, 2011.

Reviewed paper for International Journal of Robotics and Integrated Manufacturing, Elsevier, 2011.

Reviewed papers for International Conference on Advances in Supply Chain and Manufacturing Management, IIT Kharagpur, June 2011.

Reviewed papers for Management Journal, IIM Indore, 2011.

Reviewed book chapter on Operations management, Cengene Publisher, 2011.

Pandey, A.
Reviewed papers for Journal of Management, Spirituality and Religion, Springer

Patil, R.J.
Reviewed a paper for the International Journal of Management Science (OMEGA).

Reviewed papers for the fifth international conference on *Improving Competitiveness through Decision Sciences* held during 4th to 6th January 2012 at the Great Lakes Institute of Management, Chennai.

Rao, S.N.
Member, Journal Review Panel, European Journal of Finance

Sonar, R.M.

Reviewed papers for various national journals related to IT/ICT.

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. Arti Kalro
Marketing Management, Communication and Presentation Skills

4. Ashish Pandey
Organization Development, Organization Behavior (Macro)

5. Atanu Ghosh
Strategic management, Services Marketing, Relationship Marketing, Supply Chain Management Product Launch and Brand Building

6. Dinesh Sharma
Marketing Strategy, Market Research

7. Gajendra K. Adil
Operations Management and Decisions Sciences

8. Hans Huber
Network competition and policy, Regional Air Traffic, Aviation Business Strategies

9. Indrajit Mukherjee
Operations Management, Process Optimization, Statistical Process Control, Quality Engineering

10. Karuna Jain
Operations Management, Technology and Innovation Management, Supply Chain Management, Project Management, Intellectual Property Management

11. Kirankumar Momaya
Competitiveness, Strategic / Technology Management

12. Niranjan Tarikere
Operations Managment

13. Pankaj Dutta
Operations Research, Retail Inventory & Supply Chain Modeling, Project Management, Mathematical Finance, Business Dynamics Modeling & Simulation, Fuzzy Optimization

14. Rahul Patil
Operations Management, Supply Chain Management, Stochastic Optimization, Innovation Diffusion

15. Rajendra Sonar
Intelligent systems, hybrid Intelligent systems, business intelligence using knowledge-based systems, N=1 Analytics

16. Shivganesh Bhargava
Prediction of Performance, Organizational Wrongdoing, Reward Preference in Indian Organizations, Managing of Human resources in Technical Institutes

17. Sapar Narayan Rao
Corporate finance, Investment Management, Valuation, Mergers & Acquisitions, Capital Markets

18. S. V. D. Nageswara Rao
Corporate Finance and Capital Markets

19. Shishir Kumar Jha
Copyright, Digital Economy, International Business

20. Trupti Mishra
Economics: Economics of Pollution and Climate change, Valuation of Water Resources

21. Usha Ananthakumar
Applied Statistics, Applied Multivariate Analysis.

22. Varadraj Bapat
Financial Reporting, Managerial Accounting, Financial Inclusion

23. Vinish Kathuria
Industrial organization, Environmental management, Regulatory economics

Distinguished Guest Professors

1. Dr. Jahar Saha
Operations Research

Adjunct Faculty

1. Dr. Kamal Sharma
Managerial Effectiveness Skills, Technology Forecasting and Assessment

2. Dr. Raj Hirwani
Patent Analysis, Intellectual Property Rights

3. Dr. S.A. Kelkar
Industrial and Operations Engineering, Software Engineering And Quality Assurance (Testing and Matrices)

4. Dr. Atul Kanyalkar
Purchase and Supply Chain Management

5. Mr. Kamlesh Pande
Innovation Management, Knowledge Management

6. Mr. Sanjeev Chachondia
Industrial Marketing

Centre for Environmental Science & Engineering

Introduction

The Centre for Environmental Science and Engineering (CESE) was established in 1985. The centre has a core group of eight faculty members with multi-disciplinary background and diversifying research interests. Currently, the centre is expanding teaching and research activities and has started a new dual degree M.Sc.–Ph.D. programme since July 2010 in addition to the already existing M.Tech. and Ph.D. programmes. Besides, the centre is running a minor in Environmental Science and Engineering for undergraduates studying in other departments at IIT Bombay. In the near future, a dual degree B.Tech.-M.Tech. programme will also be started. CESE also offers an institute core course "Environmental Studies: Science and Engineering" to undergraduates and M.Sc.–Ph.D. students. The centre runs several elective courses for sensitizing students across all disciplines towards the urgent need for protection and restoration of environment by adapting environment-friendly lifestyles.

An MoU was signed between IIT Bombay and Thane Municipal Corporation (TMC) for research collaboration and another between IIT Bombay and TISS for research and academic collaborations. A proposal was also jointly submitted by IIT Bombay and New Castle University, titled: "Newcastle and Mumbai Partnership on Sustainability and Environment Research (NAMPSER)" under UKIERI, British Council (Coordinator: Prof. V. Sethi).

As part of Infrastructure development, renovation of Air Pollution Monitoring Lab (First floor) and Microbiology and Hazardous Waste Lab (Ground floor) has been done.

Academic Programme

CESE currently offers M.Tech., Ph.D. and M.Sc.-Ph.D. programmes in Environmental Science and Engineering with a strong focus in teaching and research.

Degrees Awarded		
M.Tech.	:	15
Ph.D.	:	4

R&D Activities

The ongoing 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.

Scholarships:

Category	Number of Students Admitted Under Each Programme in 2011		
	M. Tech.	Ph.D.	M.Sc. - Ph.D.
Institute Teaching Assistance (TA)	16	7	9
External sponsored College Teacher (CT) Industry	2	2	-
Project sponsored (PS)	-	1	-
UGC/CSIR/DBT/QIP/ CPHEO fellowship holders	-	2	-

Sponsored Research Projects

Four new projects have been awarded in 2011-2012. The details of the projects are given below.

Sponsored Research Projects	**:**	**22**
New	:	4
Ongoing	:	4
Completed	:	14

New Projects

"Biological Treatment of Biomass Gasifier Wastewater Using Algal-Bacterial System in Rotating Biological Contactor" by DBT, New Delhi

"Characterization and Treatment of Wastewater from Large/Small Scale Biomass Gasification Systems" by IIT Bombay, by ACCESS Scheme

"Evaluation of Trophic States of Lakes in Thane City" by Thane Municipal Corporation, Government of Maharashtra, Thane

"Multivariate Flood Frequency Analysis: Nonparametric Approach" by Department of Science and Technology, Government of India, New Delhi

Completed Projects

"Surfactant Aided Biodegradation of Model NAPLs" by DST, New Delhi

"Sampling and Analysis Techniques for Bioaerosol Standardization and Field Evaluation of Airborne Endotoxins" by DST, New Delhi

"Sampling and Analysis Techniques for Bioaerosols" by DST, GOI

"Development of Two-Step Treatment Strategy for Effluent Generated From Agro Based Pulp and Paper Mills" by DST, New Delhi

Ongoing Projects

"Life Cycles of Metals in Coal Combustion: Speciation in Fly Ash, and Transformations during Ash Reuse and Storage" by MacDonnald Research Scholars Academy, Washington University, St. Louis, USA

Indo-South African Collaborative Sponsored Research Project "Energy Recovery Options from Municipal Solid Waste and Control Treatment Measures of Carbon Emissions from Landfills" by DST, New Delhi

"Climate Change Research: Atmospheric Aerosol Characterization using Multi-Sensor Data from Satellite and Ground Observations" by Lloyd Register Engineering Education and Research Trust

"Environmental Quality and Pollution: Ganga River Basin Management Plan" by MoEF, New Delhi

"Simultaneous Nitrification/Denitrification of Nitrogen Fertilizer Wastewater using Sequencing Batch Bioreactor with Mixed Biomass Containing *Thiosphaera Pantotropha*" by DBT, New Delhi

"Measurement and Characterization of Airborne Biological Particles" by DST, GOI

"Wastewater Minimization in Batch Plants Through On-Site Treatment, Reuse And Recycle Processes" by DST, New Delhi

"Energy Recovery Options from Municipal Solid Waste And Control/Treatment Measures of Carbon Emissions From Landfills" by DST, New Delhi

"Simultaneous Nitrification/ Denitrification of Nitrogen Fertilizer Wastewater Using Sequencing Batch Bioreactor with Mixed Biomass Containing *Thiosphaera Pantotropha*" by DBT, New Delhi

"Degradation of Phenolic Wastewater Using Catalytic Wet Oxidation Process" by IRCC, IIT Bombay

"Constructed Wetlands and Natural Treatment Systems for Wastewater Treatment and Reuse *i.e* 'Saph Pani' by European Commission

"Preventive Technological Interventions for Improving Environmental Attributes of Ship Recycling in Alang *i.e.* 'Green Alang' Initiative" by Gujarat Maritime Board, Govt. of Gujarat

"Dismantling of Vessels with Enhanced Safety and Technology *i.e.* 'DIVEST' by European Commission

"Ganga River Basin Environnent Management Plan (GRB-EMP)" by MoEF, GOI

Consultancy Projects:

One consultancy job was undertaken by two faculty members. The income generated from the consultancy work was Rs. 2.9 crores.

Patents

Asolekar, S.R.
Indian Patent Application No.: 2475/MUM/2010 (In progress) "Site Remediation Technology" (Remediation Technology for Soils, Sediments and Aquifers Solids at Sites Contaminated by Oil Spills or Hazardous Wastes)

Extension Activities

The centre is also actively engaged in organizing workshops and CEP courses for benefiting the professional from other academic institutions, industries and governmental sectors.

It organised the following:
International Workshop on "*Environmental Statistics*

for Professionals" (ESP2011) jointly with Thadomal Shahani Engineering College, Mumbai at Mumbai, December 27-30, 2011.

Indo-Canadian Bilateral Workshop on "Management and Valorization of Industrial and Agricultural Wastes" (MVIAW 2011) held on 12th October, 2011 in IIT Bombay; jointly organized by CESE IIT Bombay, INRS & Laval University, Quebec City, Canada, Sponsored by the Ministry of Education and Sports, Quebec, Canada. Convenors: Prof. Suparna Mukherji and Prof. Anurag Garg, CESE, IIT Bombay; Prof. Satinder Brar, INRS, Canada and Prof. Stephane Godbout, Laval University, Canada.

Training programme on "Biology in Pollution Mitigation, Sewage Treatment, In-situ Bioremediation and Bacteriophages" 13th-15th Feb, 2012, IIT Bombay, sponsored by, Central Pollution Control Board (CPCB), New Delhi.. Participants were officers from various State Pollution Control Boards, CPCB Zonal Labs and other Government organizations. Course Coordinator: Prof. Suparna Mukherji

A two–day retreat was organized for all IITB faculty under FARM-2012 (Faculty Research and Academic Meet) on IITB Campus to brainstorm with focus on Research at IITB.

A meeting was held between the core organizing team of the MAGEEP-2012 Symposium (TISS, WUStL and IITB) on December 10, 2011, as a part of the ICAER to develop a roadmap for the ACCESS initiative. The meeting included invitation to several NGO's working in the area of rural energy supply.

Visitors to the Department

Mr. Mervyn Goronszy, Bisco Pty Limited, Australia. Delivered seminar on "Why All Sequential Batch Reactors (SBRs) Are Not Equal" on 1st February 2012.

Prof. Daniel E. Giammar, Associate Professor, Department of Energy, Environmental and Chemical Engineering, Washington University, Saint Louis, Mo, USA. Visited to discuss research findings in joint research project during December 9-11, 2011.

Prof. Satinder Brar, INRS, Canada. She delivered a lecture on "Sustainable Value-addition of Agro-Industrial Wastes into Bio-products and their Application" in the Indo-Canadian Bilateral Workshop on "Management and Valorization of Industrial and Agricultural Wastes" (MVIAW 2011) held on 12th October, 2011 in IIT Bombay.

Prof. Stephane Godbout, Laval University, Canada. He delivered a lecture on "Life Cycle Analysis of Agricultural Wastes" in the Indo-Canadian Bilateral Workshop on "Management and Valorization of Industrial and Agricultural Wastes" (MVIAW 2011) held on 12th October, 2011 in IIT Bombay.

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

Hiremath, A. M., Tilwankar, A. K., Asolekar, S. R.
"Research and Development Activities in Alang" in *3rd National Conference on Ports and Infrastructure* held in Ahmedabad; September 16 - 17, 2011.

Asolekar S.R.
"Significance of Risk Based Application of Technology" in the *IEA Annual Conference Advances in Environmental Management and Technology (Enviro*Vision*2011)* organised by the Indian Environmental Association (IEA) held in Ahmedabad; November 26 - 27, 2011.

"Green Ship Recycling in Alang" in *Ninth Annual Conference on Ports in India-Capacity Expansion and Improving Efficiency: The Way Forward* held in Mumbai; January 30 - February 1, 2012.

"Management Strategies for Polluted Sediments" in *3rd International Conference on Sediment Management (I2SM – 2012)* held in Alibag during March 20 - 22, 2012 jointly organised by Association of Environmental Analytical Chemistry of India, Bhabha Atomic Research Centre, India and Mines de Douai, Paris, France.

Mandal S.K., Banerji T., Chaudhari S.
"Mobilization of Arsenic from Arsenic Removal Plant Sludge", presented in the *27th National Convention of Environmental Engineers organised by Institute of Engineers (India)* on 24-25th January, 2012 in Mangalore, India.

Chaudhari S.
International Conference on Water Quality with special reference to Arsenic, held on February 18-20, 2012 at Kolkata, West Bengal.

Dikshit, A.K.
Participated in 2012 2nd International Conference on "*Life Science and Technology*" (ICLST 2012) at Hong Kong, January 5-7, 2012. Also presented paper titled "Adsorption of O-Cresol using Activated Carbon" in the conference.

Jeswani, H., Mukherji, S.
"Comparison of Acute Toxicity of Algal Metabolies using Bioluminescence Inhibition Assay", *27th National Convention of Environmental Engineers on Green Technologies, Sponsored by the Institution of Engineers*, January 24-25, 2012, NIT Suratkal, Mangalore, Karnataka, India.

Phatak, P.S., Garg, A., Gupta, S.K., Mukherji, S.
Presented a paper "Impact of Media Composition on Abiotic Losses During Biological Nitrogen Removal from Nitrogen Rich Industrial Wastewater" *27th National Convention of Environmental Engineers on Green Technologies,* Sponsored by the Institution of Engineers, January 24-25, 2012, NIT Suratkal, Mangalore, Karnataka, India.

Mukherji, S.
"Treatment of Biomass Gasification Wastewater" *Annual Symposium on Energy Futures,* organized by IIT Bombay-Monash Research Academy, November 26-28, 2011, IIT Bombay, Mumbai, India.

"Fate of Organic Pollutants in Aquatic Environment," *Mini Symposium on Aquatic Environment and Health Management: Status and Challenges,* June 2, 2011, Central Institute of Fisheries Education (CIFE), Mumbai, India.

Patil, R.S., Sethi, V., Sharma, R.
"Ventilation Design for Indoor Air Quality Management", *Environmental Information Association 12th National Conference & Exposition*, March21-25, 2012,SanDiego,CA,USA

Patil R.S., Balasubramanian S.
"Indoor Air Quality in Schools of Different Socio-economic Status in Mumbai", *The 12th Int Conf on Indoor Air Quality and Climate* ,June 5-10, 2011 ,Texas, Austin

"Assessment of Health Benefits due to Reduction in Personal Exposure", *the 12th Int Conf on Indoor Air Quality and Climate* ,June 5-10,2011 Texas, Austin

Gangamma S., Patil R.S., Mukherji, S.
"Measurement and Characterization of Biological Activities of Ambient Particular Matter at Different Locations in Mumbai", *AWMA's 104th Annual Conf & Exhibition,* June 21-24, 2011 , Orlando, Florida, US

Sonawane, N.V., Patil, R.S., Sethi, V.
"Health Benefit Modeling and Optimization of Vehicular Pollution Control Strategies", *AWMA's 104th Annual* Conf *& Exhibition* , June 21-24 ,2011 , Orlando, Florida, US

Chaudhari S., Pramanik S., Banerji, T.
"Electrochemical Synthesis of Magnetite and its Applicability as an Adsorbent for Arsenic, *Conference on Arsenic in Groundwater in Southern Asia,* on 14-17th November, 2011 at Hanoi, Vietnam.

Mandal, S.K., Banerji T, Chaudhari S.
"Studies on the possibilities of Solidification/ Stabilization of Arsenic Laden Iron Hydroxide Sludge, *Conference on Arsenic in Groundwater in Southern Asia,* on 14-17th November, 2011 at Hanoi, Vietnam.

Banerji T., Chaudhari S.
"Development and Field Evaluation of the IITB-Arsenic filter", *Conference on Arsenic in Groundwater in Southern Asia,* on 14-17th November, 2011 at Hanoi, Vietnam.

Agnihotri, S., Mukherji, S., Mukherji, S.
"Synthesis and Characterization of Silver Nanoparticle containing Glass Fibers for Antimicrobial Applications", *International Conference on Nanoscience and Technology (ICONSAT - 2012)*, January 20-23, 2012, Hyderabad, India.

"Evaluation of Chitosan-PVA Hydrogel as a Nanoreactor and an Immobilization Matrix for Silver Nanoparticles", *International Conference on Advanced Nanomaterials and Nanotechnology (ICANN-2011)*, 08-10 December 8-10, 2011, IIT Guwahati, Assam, India.

Mukherji, S., Jeswani, H.,
"Treatment of biomass gasifier wastewater in a rotating biological contactor", *IWA Biofilms Conference 2011: Processes in Biofilms,* October 27-30, 2011, Tongji University, Shanghai, China.

Mukherji S.
"Management of Wastewater from Tanneries" *Indo-Canadian Bilateral Workshop on Management and Valorization of Industrial and Agricultural Wastes (MVIAW 2011)*, 12 October 12, 2011, IIT Bombay, Mumbai, India.

International Workshop on Public Private Parternership (PPP) Models and Technological Solutions in Sewage and Waste Management, September 22-23, 2011, IIT Delhi, New Delhi, India.

Lokeshappa, B., Dikshit, A.K.
"Metals and Their Leachings in Coal Fly Ash Ponds", *National Conference on Environment Perspectives and Concerns for 21st Centaury* (EPC2011), Andhra University, Vishakhapatnam, June 28-29, 2011.

"Environmental Hazards of Metals in Coal Fly Ash", *National Conference on Environmental Concerns and Sustainable Development: Issues and Challenges for India* (ECSD2012), Banaras Hindu University, Varanasi, March 2-4, 2012.

Pathak, R.K., Dikshit, A.K.
"Atrazine and Its Environmental Impacts", *National Conference on Environment Perspectives and Concerns for 21st Centaury* (EPC2011), Andhra University, Vishakhapatnam, June 28-29, 2011.

"Effect of Various Parameters on Biosorption of Atrazine", *Proceedings of 3rd International Conference on Environment and Sustainable Development* (ICESD2012), Hong Kong, January 5-7, 2012.

Kulkarni, D.A., Dikshit, A.K.
"Solid Waste Management: A Sustainable Approach", *National Conference on Environment Perspectives and Concerns for 21st Centaury* (EPC2011), Andhra University, Vishakhapatnam, June 28-29, 2011.

"Metal Release during Long Term Aging of Indian Ash Suspensions", *National Conference on Environmental Concerns and Sustainable Development: Issues and Challenges for India* (ECSD2012), Banaras Hindu University, Varanasi, March 2-4, 2012.

Shivpuri, K.K., Dikshit, A.K.
"Environmental Concerns of Nuclear Wastes", *National Conference on Environment Perspectives*

and Concerns for 21st Centaury (EPC2011), Andhra University, Vishakhapatnam, June 28-29, 2011.

Farejiya, M.K., Dikshit, A.K.
"Minimizing Thermal Pollution in Marine Environment", *National Conference on Environment Perspectives and Concerns for 21st Centaury* (EPC2011), Andhra University, Vishakhapatnam, June 28-29, 2011.

Nagabhushan B., Dikshit, A.K.
"Membrane Bioreactors as Viable Technology for Distillery Wastewater Treatment", *National Conference on Environment Perspectives and Concerns for 21st Centaury* (EPC2011), Andhra University, Vishakhapatnam, June 28-29, 2011.

"Sustainable Waste Management: Case Study of Distillery Wastes", *National Conference on Environmental Concerns and Sustainable Development: Issues and Challenges for India* (ECSD2012), Banaras Hindu University, Varanasi, March 2-4, 2012.

Shabiimam, M.A., Dikshit, A.K.
"Treatment Options for Sustainable Leachate Management", *National Conference on Environmental Concerns and Sustainable Development: Issues and Challenges for India* (ECSD2012), Banaras Hindu University, Varanasi, March 2-4, 2012.

"Physico-Chemical Treatment of Municipal Solid Waste Landfill Leachate", *National Conference on Environment Perspectives and Concerns for 21st Centaury* (EPC2011), Andhra University, Vishakhapatnam, June 28-29, 2011.

Chaudhary, R., Dikshit, A.K.
"Detoxification of Arsenic Contaminated Groundwater by Physico-chemical and Biological Methods", *National Conference on Environmental Concerns and Sustainable Development: Issues and Challenges for India* (ECSD2012), Banaras Hindu University, Varanasi, March 2-4, 2012.

Shivpuri, K.K., Dikshit, A.K.
"Management of Nuclear Wastes", *National Conference on Environmental Concerns and Sustainable Development: Issues and Challenges for India* (ECSD2012), Banaras Hindu University, Varanasi, March 2-4, 2012.

Conferences/Symposia/Workshops/ Seminars (Coordinated / Chaired by Faculty)

Dikshit, A.K.
Chairman of the technical session on Industrial Environmental Management in the "*National Conference on Environmental Perspectives and Challenges for the 21st Century (EPC2011)*" organised by A.U. College of Science and Technology in association with A.P. Pollution Control Board at A.U. Visakhapatnam on June 28-29, 2011.

Chairman of International Workshop on "*Environmental Statistics for Professionals*" (ESP2011) organised jointly by IIT Bombay and TSEC, Mumbai at Mumbai, December 27-30, 2011.

Chairman of the 2012 2nd International Conference on "*Life Science and Technology*" (ICLST 2012) organised by Asia-Pacific Chemical, Biological & Environmental Engineering Society at Hong Kong, January 5-7, 2012.

Chairman of the 2012 2nd International Conference on "*Clean and Green Energy*" (ICCGE 2012) organised by Asia-Pacific Chemical, Biological & Environmental Engineering Society at Hong Kong, January 5-7, 2012.

Chairman of the 2012 3rd International Conference on "*Environment and Sustainable Development*" (ICESD 2012) organised by Asia-Pacific Chemical, Biological & Environmental Engineering Society at Hong Kong, January 5-7, 2012.

Asolekar, S.R.
Chairman of the "Technical Committee" and member of the "Organization Committee" for the IEA Annual Conference (*Enviro*Vision*2011)* organised by the Indian Environmental Association (IEA) entitled *Advances in Environmental Management and Technology* during November 24 - 26, 2011 in Ahmedabad.

"Hazardous Wastes Management" A *CEP course organized for Andhra Pradesh Pollution Control Board* in IIT Bombay, Mumbai; April 11-14, 2011.

"Hazardous Wastes Management" *A CEP course organized for Andhra Pradesh Pollution Control Board* in IIT Bombay, Mumbai June 26-29, 2011.

"Management of Common Effluent Treatment Plants (CETP)" *A CEP course organized for Bangladesh Exports Processing Zones Authority, Dhaka, Bangladesh* in IIT Bombay, Mumbai; November 15 - 18, 2011.

Patil, R.S.
Chaired the Session I "Green Initiatives" *Int. Symposium on a Sustainable Future – 2012* on Jan. 21-22, 2012 at Indira Gandhi Institute of Development and Research, Mumbai.

Invited Lectures

Sethi, V.
"The ACCESS Initiative", RuDiCON-2012, Rural Energy Security Through Distributed Clean Power Generation, Indian Merchants Chamber, Mumbai, January 20, 2012

Dikshit, A.K.
"Minimising the Environmental Impacts of Refinery Operations using LCA Approach". A.U. College of

Science and Technology, Visakhapatnam on June 28-29, 2011.

"Achieving Sustainable Future for Society and Industry". Indira Gandhi Institute of developmental Research, Mumbai on January 19, 2012.

"Biotechnology and Environment", *International Conference on Life Science and Technology (ICLST 2012)* held on January 5-7, 2012 at Hong Kong.

Mukherji, S.
"Algal-Bacterial System for Treatment of Oily Wastewater in an Attached Growth Bioreactor", Department of Biological Sciences, Birla Institute of Technology and Science (BITS) Pilani, Goa, India, January 12, 2012.

"Bioremediation of Oily Wastewater and Sludges and Impact of Surfactants" Department of Civil Engineering, IIT Kharagpur, Kharagpur, India, July 7, 2011.

Garg, A.
"Options for Material Recycling and Energy Recovery From Municipal Solid Waste in India," Indian Institute of Petroleum, Dehradun, June 6, 2011.

Asolekar, S.R.
"The Ship Recycling Concept of Green Alang" Invited by the International Maritime Organization (IMO), London, U.K. to speak at the 6th *Annual Ship Recycling Conference* held during June 14-15, 2011 in London, U.K.

Seminar on "Development in Alang and the Education and Training Activities within Green Alang Initiative" at the Ship Owners' Association, Oslo, Norway on 13th May, 2011.

Seminar on "Green Dimensions of Ship Recycling in India" at University of Lund, Lund, Sweden on 12th May, 2011.

Seminar on "Preventive Environmental Strategies used in Ship Recycling in India" at Linneus University, Kalmar, Sweden on 10th May, 2011.

Chaudhari S.
"Performance of Handpump Attached Indigenous Arsenic Removal Filter based on Zerovalent Iron", *National Conference on Water Purification Technologies & Management* held on 8-9th February, 2012 at Nerul, India.

Significant Awards/ Distinctions

Awards:

Dikshit, A.K.
Excellent Paper Award for "Adsorption of O-Cresol using Activated Carbon", presented in the *International Conference on "Life Science and Technology (ICLST 2012)*, Hong Kong, on January 2012.

Excellent Paper Award for "Behaviour of Metals in Coal Fly Ash Ponds", presented in 2012 *3rd International Conference on Environment and Sustainable Development (ICESD2012)*", Hong Kong, January 2012.

Associate Editor, Arabian Journal of Geosciences (Publishers: Springer, Germany)

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)

Garg, A.
Editorial Board Member, American Journal of Engineering and Applied Sciences (AJEAS)

Honorary Work

Patil, R.S.
Reviewed Papers for Environmental Monitoring and Assessment; Journal from Springer (Netherlands)

Asolekar, S.R.
Member of the quasi-judicial *Supreme Court Authority* entitled "Dahanu Taluka Environmental Protection Authority (DTEPA)" entrusted with 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); Member of the core team for authoring section of the 12th Five-Year Plan (2012-2017) called "Steering Committee on Environment, Forests and Wildlife" appointed by the Honorable Planning Commission of India under Chairmanship of Dr. K. Kasturirangan (November 2010 to March 2012).; Member of the "Expert Committee" constituted by the Honorable Planning Commission of India to conduct mid-term assessment of the environment-related commitments made in the 11th Five-Year Plan (2007-2012) *vis-à-vis* the ground-truth in the field under the Chairmanship of Dr. K. Kasturirangan (August 2009 to December 2010); Member of the "Technical Expert Panel (TEP)" for the World Bank aided project entitled: "Capacity Building for Industrial Pollution Management Project (CBIPMP)" constituted by the Ministry of Environment and Forests, Govt. of India, New Delhi (November 2010 to present)

Dikshit, A.K.
Reviewed papers for Journal of Environmental Engineering (ASCE); Bioresource Technology; Journal of Clean Technology and Environmental Policy; Waste Management; Environmental Modelling & Software; Journal of Environmental Engineering Science; Waste

Management and Research; Water Science and Technology during April 2011-March 2012.

Member, Advisory Committee for Bio-Medical Rules, Govt. of Maharashtra since 2009; Member, Academic Advisory Committee, Nirma University, Ahmedabad since 2010; Member, Sub-Committee for 'Development of National Sustainable Habitat Parameters in the field of Storm Water Management' constituted by the Carbon Credit Cell of the Ministry of Urban Development, Govt. of India since 2010; Honorary Professor in the School of Civil Engineering, Faculty of Engineering, University of KwaZulu-Natal, Durban, South Africa.

Mukherji, S.
Reviewed paper for International Conference, "International Conference on Metallurgical Coatings and Thin Films (ICMCTF)", March, 2012; International Journal, "Bulletin of Environmental Contamination and Toxicology", March, 2012; International Journal, "International Biodeterioration & Biodegradation", March, 2012. ; International Journal, "3Biotech", December, 2011; International Journal, "Polish Journal of Environmental Studies", October, 2011; International Journal, "Journal of Hazardous Material", August, 2011; International Journal, "Journal of Hazardous Material", June, 2011; Associate Editor for International Journal, "Applied Nanoscience"

Garg, A.
Reviewed paper for Journal of Industrial Ecology, April 2011; Environmental Engineering and Management Journal, July 2011; Environmental Technology, October 2011 ; Reviewed a project proposal submitted for funding to Knowledge Foundation, Sweden in October 2011.

Karmakar, S.
Reviewed paper for Journal of the American Water Resources Association, April 2011; Journal of Computing in Civil Engineering, April 2011; Journal of Flood Risk Management, May 2011; Hydrological Processes, May 2011; Computing in Civil Engg., ASCE, June 2011; Journal of Indian Society of Hydraulics, July 2011; International Journal of Hydrology Science and Technology (IJHST), August 2011; Reviewed paper for Journal of Flood Risk Management, January 2012; Reviewed paper for Water Resources Research, AGU, February 2012; Reviewed paper for Journal of Hazardous, Toxic, and Radioactive Waste, ASCE, November 2011; Member, Editorial Advisory Board, Journal of Disaster Advances, India.

Faculty Members and their Specializations

1. **Virendra Sethi**
   Air Pollution Science and Engineering, Aerosol Transport Measurements, Aerosol Characterisation. Satellite Data Assisted Air Quality Management, Biomass Gasification Hot Gas Cleanup, Engineering Education.

2. **Anil K. Dikshit**
   Water and Wastewater Treatment Technologies; Urban Solid Waste Management; Environmental Systems Modelling and Optimization; Environmental Management and Impact Assessment; GIS Applications for Environment.

3. **Anurag Garg**
   Catalytic wet oxidation; Biological treatment processes for wastewater treatment, Municipal Solid waste characterization and treatment, Energy from solid waste; Decision support modeling for solid waste management.

4. **Sanjeev Chaudhari**
   Arsenic removal from water
   Biological nutrient removal from wastewater
   Application of Natural coagulants for water and Wastewater treatment
   Treatment of textile wastewater by biological and physicochemical processes

5. **Shyam R. Asolekar**
   Achieving near-zero emissions and improvement in environmental performance through application of innovative preventive environmental management of an industry or community

   Application of preventive environmental management by incorporating waste minimization, cleaner and greener technologies, eco-industrial networking and corporate social responsibility (Sectors: ship dismantling and recycling yards, ship repairing yards, ports and harbors, individual industry, industrial estates, urban bodies, *etc.*)

   Treatment of domestic sewage and industrial wastewaters for pollution control and reuse especially combination of tertiary treatment technologies (advanced solutions) with low cost natural treatment systems (ecological solutions) aimed at reuse of sewage and industrial effluents for:
   a. Rejuvenation of ponds, lakes, rivers and wetlands (natural aquatic environment)
   b. Applications in green buildings, green habitats (urban and built environment)

   Assessment of technologies aimed at development of appropriate and rational treatment strategy to achieve a given desirable goal through development and application of *Decision Support Tool*s based on "life cycle" approach, minimization of carbon footprint and sustainability criteria

   Application of technologies and management strategies for hazardous, solid, and biomedical wastes including decontamination of soils and sediments

   Application of remotely sensed data for monitoring and modeling of environmental systems; Environmental planning, policy and law

6. **Subhankar Karmakar**
   Environmental and Water Resources Systems Engineering, Uncertainty Modeling, Risk to Extremes and Vulnerability Assessment.

7. **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)

8. **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

9. **Rashmi S. Patil**
   Emeritus Fellow
   Air Quality Monitoring, Modelling and Management; Indoor Air Quality and Exposure Assessment; Environmental Impact Assessment.

10. **Rakesh Kumar**
    Visiting Professor
    NEERI, Mumbai Zonal Center, Mumbai

11. **Krishnanand Maillacheruvu**
    Visiting Associate Professor
    Associate Professor, Department of Civil Engineering & Construction, Bradley University, Peoria, State of Illinois, U.S.A. during 5th January to 29th June, 2011.

Industrial Design Centre

Introduction

Set up in 1969, the Industrial Design Centre offers an excellent environment for academics, research and applications in the field of design. The centre has M.Des. and Ph.D. programmes in the areas of Industrial Design, Visual Communication, Animation, Interaction Design and Mobility and Vehicle Design. The education programme at the centre is a unique mix of pedagogic experimentation with a pragmatic design approach and blends hard-core problem-solving with design research. New thoughts, philosophies and research into several aspects of design are experimented and integrated to have a continuous revitalisation of the academic programmes at the centre. The centre interacts with industries and institutions for promotion and awareness of design. These are in the form of organizing seminars, conducting short term courses and workshops. In the area of design practice, IDC offers professional design consultancy and advisory services to industries and other organizations. The total faculty strength is 26.

The major activities in department are: M.Des. in Digital Filmmaking in 2013; Minor in Design Innovation for undergraduate students of IITB; e-kalpa, MHRD Programme; Cosmic project; Dandi Memorial Programme; Development of high-end CAD modeling studio in collaboration with Fujitsu Co. and Autodesk; Developing of access facilities for persons with disabilities; DST projects related to design for the elderly and for creating visual narratives on occupational safety and health hazards for working women in different professions.

Academic Programmes

The M.Des. programme in Product Design, Visual Communication, Interaction Design, Animation and Mobility & Vehicle Design 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.

The institute has signed memoranda of understanding with TU-Darmstadt and Hochschule fuer Gestaltung-Schwaebisch Gmuend, Germany. Students from these institutions came to the centre for course/project work. IDC has made collaboration with NID Ahmedabad and the Department of Design, IIT Guwahati, on 'e-kalpa' project.

Students Intake		
M.Des.	:	58
Ph.D.	:	7
Degrees Awarded		
M.Des.	:	7
Ph.D.	:	4

R&D Activities

Sponsored Research Projects

Sponsored Research Projects	**:**	**42**
New	:	3
Ongoing	:	31
Completed	:	8

Project Title	Sponsoring Agency	Status (New/ Ongoing/Complete
"Metaphors of Gratitude"	IRCC	Ongoing
"Visual Ethnography' and 'Elements of Image-making", D'Source Titled "Kaavad, Portable Shrine"	MHRD	Ongoing
"Online Design Resource Gallery for e-kalpa, D' Source (headed by Prof Ravi Poovaiah, 12 photo Stories that include Nature and Typography, Clock Shrines, Patterns in Sand etc".	MHRD	Ongoing
"Multi-modal Support for VUIs for Low Techsavvy users"	IBM	Ongoing
"UNITE"	Johnson & Johnson	Ongoing
"Creating Learning Materials for Children"	Navajbai Ratan Tata Trust	Ongoing
"Award of "Faculty Research Fellowship, for India Post"	Govt. Of India	Ongoing
"Design of Gumming Device for Post Office Use, for India Post"	Govt. of India.	Ongoing
"Design of Self Locking Seal Tag and Label, for India Post"	Govt. of India	Ongoing
"Experimental Explorations in Transport Vehicle Design through investigations in Bionics"	IRCC (SEED)	Ongoing
"Frugal innovation approach towards enhancing driver environment for Volvo 9400"	VOLVO Technology Corporation, Sweden.	Ongoing
'Truck Interior Design for India'	VOLVO Technology Corporation, Sweden.	Ongoing
"Concept Design of One Ton Goods Carrier for Indian City Conditions"	VOLVO Technology Corporation, Sweden.	Ongoing
"Documentation & Archiving of Traditional Visual Storytelling, Puppet & Toy making Traditions of India"	IRCC	Ongoing
"Empowerment of Student and Teachers Through Synchronous and Asynchronous Instruction"	Ministry of Human Resource Development (CoPI)	Ongoing
"Development of Educational Films using the Interplay between New Media, Technology and Pedagogy in Science Education at the High School Level in the Indian Context"	IRCC	Ongoing
"Development of Online Modules Teaching Animation"	Ekalpa	Ongoing
"Product Design of Sigma Induction Cap Sealer"	Electronics Devices	Ongoing
"Industrial Engineering Project on Legacy 6100"	ACG PAM Pharma Technologies Pvt. Ltd.	Ongoing

Project Title	Sponsoring Agency	Status (New/ Ongoing/Complete
"New Logo and Product Graphics for ADOR Welding"	Ador Welding Limited	Ongoing
"New Aesthetic Look for LEGEND 1500"	ACG PAM Pharma Technologies Pvt.	Ongoing
" Making Two More Shields (Mementos)"	Atomic Energy Regulatory Board	Ongoing
"Training of Tribals of Gadchiroli Circle"	T. Sd.S.K .Reddy Ifs Chief Conservator Of Forests	Ongoing
"Visual Identity Design for BARC"	BARC	Ongoing
"Development of Prototypes in Mobility Lab"	IRCC	Ongoing
"Design and Development of Hygienic Toilet for Rural Areas"	Ministry of Drinking Water & Sanitation	Ongoing
"Making Films using Affordable Digital Technologies for Educational Purposes by Understanding the Existing Mass Appeal for Entertainment Movies in India"	by IRCC	Ongoing
"New Design of Stability Chamber:	Thermolab Scientific Equipments	Ongoing
"Storage Possibilities and Walk through Clearance in Indian Trucks"	Volvo Technology Corporation (Vtec)	Ongoing
"Deep Social Media Research Centre"	Media Development Authority, Singapore	Ongoing
"E-kalpa"	MHRD	Ongoing
"Development of Robust Document Image Analysis & Recognition System for Printed Indian Scripts"	DIT	New
"Indian Language Input Method"	Nokia India Pvt Ltd	New
"Making Films using Affordable Digital Technologies for Educational Purposes by understanding the Existing Mass Appeal for Entertainment Movies in India."	IRCC, (SEED Grant)	New
"Experimental Animation, ekalpa",	MHRD	Completed
Animated Film, 'Bemata'	IRCC	Completed
"Development of New Round Post Box, for India Post"	Govt. of India.	Completed
"Design of Stamp Cancellation Work Station for India Post"	Govt. of India.	Completed
"Design of Postal Trolley for Bag Handling at Railway Stations" for India Post	Govt. of India.	Completed
"Design of Hand Stamp for Post Office use, for India Post"	Govt. of India.	Completed
"Design of Philatelic Display Frame"	Govt. of India.	Completed
"Design of Scooter Operated Washing Machine"	GIAN	Completed

Consultancy Projects

The department undertook 12 jobs generating Rs.58,94,681. The total number of faculty involved was Seven.

Extension activities

Organized workshops for writers, publishers and educationists for understanding work done for children in Indian languages at Guwahati, Bhubaneswar, Pune, Nilambur and Bhopal (between July - October 2011); "Training on Advances In Ergonomics Research and Product Design – Application to Interior Space And Functional Needs of Indian Population", at the Centre of Advanced Faculty Training, Hyderabad (February3-4, 2012); 'Bambu se Ganith' , Bambarde School for tribal children near Lonawala (February 22 -26, 2012); and 'Khel se Shiksha' for Art teachers of primary schools at, Bambu Studio, IDC (November 25- 27, 2011).

IDC is also engaged in planning and preliminary work for a new school of design and creative arts at IIT Bhubaneswar(from January 2012 onwards). The faculty from IDC presented and participated in International Film Festival (MIFF), Mumbai (2012), and International Asian Women's Film Festival (IAWRT) Delhi (2012), and also screened for Vikalp at Alliance Francaise, Mumbai (2012). The faculty also developed a Student Group called VAST (Video and Animations Support Team) to create video and animation films on various technology-related subjects, and to be a support for IIT faculty to create videos and animations for use in class or online.

The following CEP courses were also conducted at the centre: "HCI 2011", June 29-July 12, 2011; "Exploring Creative Exhibition Design" for Insta Exhibitions (P) Limited, Mumbai, June - November, 2011; "Design course for Godrej," August 27, 2011 to December 13, 2011; "Graphic Design" for the designers of CapGemini, Kolkotta in December 2011; "Expo CD" 3-Day National Workshop: 'Communication Design for IT and Media Professionals scheduled during August 23rd - 25th 2012, IDC, IIT Bombay; "Expo PDi" 3-Day National Workshop: 'Exposure to Product Design and Innovation scheduled during September 27th - 29th 2012 at IDC, IIT Bombay; "Expo info Design" 3-Day National Workshop: Information Structuring, Architecture and Visualisation', scheduled during November 15 - 17 2012, IDC, IIT Bombay.

'**Urdhvam'**: Design Degree Show (DDS)-2011, an exhibition, was held at Mumbai during June 6 -7, 2011, and again at Nehru Centre, Mumbai, during June 11-12, 2011. It is an annual event showcasing the design efforts at the centre. DDS is aimed at creating design awareness in society and simultaneously offering a platform for people to meet and interact – a facilitator for new ideas to emerge and fruitful collaborations to materialize. A large number of people including students, entrepreneurs and representatives of various industries and media visited this exhibition. The show was well covered by major newspapers, magazines and TV channels.

Visitors to the Department

Ms. Shelley Page, CEO of Dreamworks India, is a famous figure in the world of animation. She visited IDC and delivered a lecture on "International Animation" on February 3, 2012.

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

Sabnani, Nina

"Coded Aspirations in the Kaavad" at a *National Conference on Semiotics and Folklore* held on September 27, 2011 North Eastern Hill University Shillong.

"Animated Ethnography" at an *International Conference ASA12: Arts and Aesthetics in a Globalising World* organized by the Association of Social Anthropologists of the UK and Commonwealth (ASA) at the Jawaharlal Nehru University, New Delhi, on 4th April, 2012.

Chakravarthy, B. K.

"Innovation by Design" in the 3rd Paper Session with a Parallel Themes: "Pedagogies / Teaching Methods in Higher Education to Enhance Innovation Capacity" at the *Innovation Educators' Conference* held during April 29-30, 2011 at the Indian School of Business (ISB), Hyderabad.

"A Conceptual Framework for Opportunity Mapping in Design and Innovation" on 2nd December 2011 in the *2nd Annual Global Conference on Entrepreneurship & Technology Innovation (AGCETI),* organized by Indian Institute of Technology Bombay (IITB) jointly with Indian Institute of Technology Kanpur (IITK), Rensselaer Polytechnic Institute (RPI), USA, and National Entrepreneurship Network (NEN), India, at the Indian Institute of Technology Bombay during December 1-3, 2011.

"Industrial design: Benefits and Burdens" in the *National Consultation on Post TRIPS IPR Regime in India – Opportunities and Challenges* organized by TERI at Casuarina Hall, India Habitat Centre, New Delhi through *video conferencing* on March 14, 2012.

Joshi, Anirudha
USAB 2011 - Information Quality in Health, Graz, Austria, Paper: Rashinkar, P., Joshi, A., Rane, M., Sali, S., Badodekar, S., Emmadi, N., Roy, D., Sheikh, R., Shrivastav, A.; "Healthcare IVR System for Non-tech Savvy Users", November 2011,

INTERACT 2011, Lisbon, Portugal, Paper: Joshi, A., Rane, M., Roy, D., Sali, S., Bharshankar, N., Kumarasamy, N., Pujari, S., Solomon, D., Sharma, H. D., Saple, D. G., Rutten, R., Ganju, Van Dam, J.; "Design Opportunities for Supporting Treatment of People Living with HIV / AIDS in India", September 2011.

INTERACT 2011, Lisbon, Portugal, Paper: Joshi, A., Sarda, N. L.; Do Teams Achieve Usability Goals, "Evaluating Goal Achievement with Usability Goals Setting Tool", September 2011

Mobile HCI 2011, Stockholm Sweden, Joshi, A., Dalvi, G., Joshi, M., Rashinkar, P., Sarangdhar, A, "Design and Evaluation of Devnagari Virtual Keyboards for Touch Screen Mobile Phones"; August 2011

Rane, Mandar
"Interactive Voice Response System to Improve Compliance with Medication, in *Mobile Plus Conference 2011*, MSSRF", held during 15-17 Sep 2011.

International Conference on Design Opportunities for supporting treatment of people living with HIV / AIDS in India, Interact 2011 Portugal during September 8 -12, 2011, Lisbon, Portugal.

International Conference on Studying Perceptual Differences between Designer and Non-Designer: A Visual Identity Design Problem, Design Principles and Practices, 2012, USA during February 20 -22, 2012, California.

"Designing Systemic Model for New Heritage Walks in India", *International Senior Project Conference (ISPC) 2012,* Taiwn, Tsing Hua University, Hinschu 22- 24 March 2012, Taiwan.

Munshi, K. M.
6th International Conference and Exhibition on Aluminium (INCAL2011) organized by Aluminum Association of India at HICC, Hyderabad, India. December 6-8, 2011.

International Conference Thinking Automotive Design, *International Academic Meeting, Workshop and Round Table,* organized by University of Sao Paulo, Sao Paulo, Brazil, 17 – 20 October 2011.

International Conference and Exhibition on Aluminum (INCAL2011), organized by Aluminum Association of India at HICC, Hyderabad, India. December 6-8, 2011.

Meeting of *Hyundai Design Council* at Hyundai R&D Centre in Korea, held during 29th August and December 1, 2011.

Ramachandran, K.
"Proposal for Designing a Lightweight City Transit Bus (LITEBUS) and Developing Guidelines" in the *National Conference on Aluminium Incall 11*, Hyderabad

International Conference and Exhibition on Aluminum Incall 11 held on December 6-8, 2011 at HICC, Hyderabad.

Sharma, Nishant and Day Dennis
"Collective Form Generation through Visual Participatory Representation: A Case Study," *International Conference Participatory Innovation Conference PINC 2012,* held during January 12 – 14, 2011,at at Swinburne University, Melbourne, Australia

"Sketches as Interaction Spaces", *International Conference Participatory Innovation Conference PINC 2012,* held during January 12 – 14, 2011, at Swinburne University, Melbourne, Australia

Mohanty, Raja
"The Magical, the Frivolous and The Ideological" in *International Seminar on Creating Content(ment) for Children* held in IDC, IIT Bombay on November 10, 2011.

"Transforming the Political while Creating for Children" in *International Seminar on the Politics of Children's Literature* held at Ravenshaw College, Cuttack, on January 9, 2012.

Medhi, I (Phd Student)
"Designing Mobile Interfaces for Novice and Low-Literacy Users." in *Proceedings of ACM Transactions on Computer-Human Interaction*, Vol. 18, No. 1, Article 2, April 2011.

Conferences/Symposia/Workshops/ Seminars (Coordinated /Chaired by Faculty)

Sabnani, Nina
Co-convener of the panel on "Field and Film Aesthetics: Sensory Anthropology and The Texture of Documentary Filmmakers' Practice' with Cathy Greenhalgh from LCC, UK.

Sreekumar, G V
Conducted a workshop on 'Publication Design' for the participants of *International Conference Typography Day 2012* , International Seminar held at IIT campus on March 1, 2012

Ray, G G
Chaired the session "Virtue Environment, A1", *Oct 6,* 2011, *International Conference 2nd East Asia Ergonomics Federation Symposium,* held on October 6, 2011, National Tsing Hua Univ, Department of Industrial Engineering and Industrial Management, Taiwan,

Chairperson, *2nd East Asia Ergonomics Federation Symposium*, National Tsing Hua Univ, Department of Industrial Engineering and Industrial Management, Taiwan, October 6, 2011.

Poovaiah, Ravi
Coordinated the *International Conference Typography Day* held during 1 – 3 March, 2012, at IDC, IIT Bombay (co-cordinator – Prof G V Sreekumar)

Invited Lectures

Bapat, V P
"Innovation at ACC-Academy" , Thane, August 1, 2011

Sandesh, R
"Craft based livelihood development", Government of Madhya Pradesh, September 27, 2011.

Ray, G G
"Transport product design for Indian Market: Trends, Challenges and Opportunities", Volvo Technology's Research and Innovation, Bangalore, September 19 , 2011.

"Ergonomics in India: Challenges and Opportunities in Indian Context", Keynote, HWWE 2011, IIT Madras, December 15, 2011

"Ergonomics / Human Factors in Design in India: A historical perspective and present status", Keynote, ICORD 2011, IISc Bangalore, Jan 11, 2011.

"Ergonomics in Asia: A Snap Shot on Status/Issues on Indian Context", *Asia Ergonomics Summit,* National Tsing Hua Univ, Department of Industrial Engineering and Industrial Management, Taiwan, October 5, 2011.

"Ergonomics in Asia: Development, Opportunities, and Challenges in Indian Context" *2nd East Asia Ergonomics Federation Symposium*, National Tsing Hua Univ, Department of Industrial Engineering and Industrial Management, Taiwan, October 6, 2011.

Chairperson for the session on "Human Factors in Design, ICoRD 2011", IISc, Bangalore, January 11, 2011

Special Invited lectures on "Ergo-Design, Department of Human Physiology and community Sciences" , Vidyasagar University, Midnapur, West Bengal, March 26-27, 2012

Chairperson, "Ergonomics Section" , PG 15, BIS, India, March 23, 2012.

Munshi, K M
"Designing a Lightweight City Transit Bus (LITEBUS) and Developing Design Guidelines", Aluminium Association of India, HICC, Hyderabad, December 6-8, 2011.

"Light weighting of Bus Body & Structures", Collaborative Automotive R&D (CAR), BusWorld Mumbai, 2011.

"LEDs – The future Lighting, Architects and Engineers Association", Nasik, September 5, 2011.

"Sustainable Mobility Initiatives in India", *International Academic Meeting, Workshop and Round Table on Thinking Automotive Design,* organized by the University of Sao Paulo, Sao Paulo, Brazil, October 17–20, 2011.

Joshi, Anirudha
"Introduction to HCI", Don Bosco Institute of Technology, Mumbai, March 2012.

"Role of IT in National Rural Employment Guarantee Act (NREGA)", Computer Society of India and Tata Institute of Social Sciences, April 2011.

"Introduction to HCI", Vidyalankar Institute of Technology, Mumbai, April 2011.

"Interaction Design in Developing Regions", *3rd International ICST Conference on e-Infrastructure and e-Services for Developing Countries, Africomm 2011,* Zanzibar, November 2011

Rao, A.G.
"Repositioning of Bamboo Craft for Better Employment; Role of Tools, Technologies, Design", *National Conference on Cluster Development of Bamboo Products – A Way To Inclusive Growth,* Hotel Golden Tulip, Raipur, July 12-13, 2011.

"Business Strategies for Tripura Bamboo Crafts : Role of Tools, Technology and Design" in *National Conference on Bamboo Plantation and Value Addition*, *at Agartala, Tripura,* 5-7 August, 2011 .

Chakravarthy, B. K.
"Innovation by Design", Acharya N.G.Ranga Agricultural University, Post Graduate & Research Center, Hyderabad, February 3-4, 2012.

Athavankar, U A
"Design Education", called by Sheriff of Mumbai, Dr. Mrs. Indu Sahani, Yes Bank conference room, Nehru Centre, Mumbai, Oct 17, 2011.

"New Challenges from Emerging Economy: Case for Innovation and social impact", *Fiserv,* Pune, Nov 11, 2011

"Games are Beyond Snakes and Ladders", Rotary Club of Bombay Seaface, Indian Merchant's Chambers, Dec 12, 2011.

"Design and Challenges from Emerging Economy", 3M, Bangalore, March 28, 2011.

"Setting the Stage" for the *Workshop on Future Directions in Design Education*, TU Delft, Goa, Sept 9, 2011.

"New route to Innovation: Frugal, Green and more effective", Danish Industry Foundation, Copenhagen, Nov 2, 2011.

Tetali, Phani
"Game Development and Design" DAIICT Gandhiagar, Gujarat, September 9, 2011.

Sreekumar, G V
"Typography", Sir JJ College of Art, Mumbai, September 2011.

"Typography", Rachna Sansad College of Art, Mumbai, November 2011.

"Information Structuring, Architecture and Visualization", 3 Day Workshop, IDC, IIT Bombay, October 20 – 22, 2011.

Significant Awards/Distinctions

Sabnani, Nina
"The Stitches Speak", Honorable Mention, Iowa City Film Festival, 2012.

"Baat Wahi Hai: FICCI-BAF", Jury's Special Award (professional category)Mumbai, 2012

Jury's Special mention Award to "Baat Wahi Hai", at the following festivals: Jaipur International Film Festival, 2012; International Film Festival Kerala, 2011; Anifest, Tasi, Mumbai, 2011; The Animation Society of India, 2011; International Video Film Festival Kerala, 2011

"Tanko Bole Chhe", Animation films, Stuttgart International Festival of Animated Film, 2012; "Tanko Bole Chhe: The Society for Visual Anthropology", best Short Film, Canada, 2011; "Tanko Bole Chhe", Royal Anthropology Institute Film Festival, UK , 2011; "Tanko Bole Chhe", Ledo Matteolis award for Best Immigration Story, Humbolt Film Festival California, 2011; "Tanko Bole Chhe", Talking Pictures, Illinois, USA, 2011

Honorary Work

Munshi, K M
Jury for India Star Packaging Awards, IIP Mumbai.

Jury for Plastinda design & Innovation competition

Joshi, Anirudha
India Representative and Treasurer for Technical Committee 13 for International Federation for Information Processing

Associate chair, full and short papers INTERACT 2011

Co-chair, full papers 2011 for India HCI 2011, co-chair review papers for India HCI 2012, and mentor Students Design Consortium India HCI 2012

Reviewer for Mobile HCI 2012, Participatory Design Conference 2012, Transactions of Asian Language Processing, CHI 2012, OzCHI 2011, USAB 2011

Sharma, Nishant
Autodesk Inventor Student Design Competition, November 16, 2011

Jury for Autodesk Competition

Faculty Members and their Specializations

1. **U. A. Athavankar**
   Basic Design,
   Product Design,
   Product Semantics,
   Cognition and Imagery,
   Environment Design,
   Furniture Design,
   Exhibition Design
2. **A. G. Rao**
   Product Design,
   Basic Design,
   Bamboo Craft, Creativity
3. **K. Munshi**
   Design & Design management,
   Mobility and Vehicle Design,
   Design Integration
4. **Ravi Poovaiah**
   Designing for children,
   Collaborative Environments,
   Digital Resources for Learning,
   Information Visualisation And Design,
   New media Design and Interaction Design,
   Visual Language and Communication Design
   Wayfinding, Identity and Information Systems
5. **V. P. Bapat**
   Basic Design,
   Product Design
6. **K. Trivedi**
   Graphic Design,
   Indian Design Traditions,
   Exhibition Design.

7. **G. G. Ray, Head**
User Centered Design,
Control Panel Ergonomics,
Workstation Design
Manual Material Handling,
Design for the Elderly,
Design for People with Special Needs.
Mobility / Vehicle Ergonomics,
Furniture ergonomics

8. **K. Ramchandran**
Product design
Mobility Design

9. **Ravi Hazra**
Architecture
Sustainability
Urban Design and Street Furniture/Signage Design
Interior and Furniture Design

10. **N Sadhu**
Product Ergonomics

11. **B. K. Chakravarthy**
New Product Innovation,
Collaborative Design,
Humanizing Technology,
Product Styling and Perception,
Creativity

12. **Anirudha Joshi**
Interaction design, Design for development, Design for low literate users, User studies / active people watching / contextual inquiry, Usability evaluation, Field studies, Integration of human-computer interaction with software engineering, Text input in Indian languages / Devanagari, ***Interaction design for healthcare, Learning design***

13. **Raja Mohanty**
Visual Arts, Visual Communications,
Art and Design Pedagogy,
Narratives and Storytelling

14. **G. V. Sreekumar**
Typography
Information Design,
Publication Design
Anatomy Drawing

15. **Nina Sabnani**
Animation film-making,
Documentary cinema,
Illustration,
Storytelling,
Visual Ethnography

16. **Shilpa Ranade**
Animation,
Illustration,
Graphic Design

17. **Sumant Rao**
Animation,
Special Effects ,
Film making, Education

18. **Mandar Rane**
Graphic Design,
Book and Publication design,
Corporate identity Systems,
Interface design and Interactive applications

19. **R Sandesh**
Product Design: Context based Industrial/Product Design
Basic Form and Form Abstraction and Expression.
Craft Practices and Traditional Vocation based Livelihood Opportunies.
Design Based Study of Traditional Craft Communities and Craft Practices.

20. **Phani Tetali**
Animation, gaming,
Storytelling with Sequential Art,
Illustration , Cartooning

21. **Balan Sudesh**
Areas of Study and Research:
Digital Film-making
Photography
Cinematography

22. **Nishant Sharma**
Automotive Design
CAID Computer Aided Industrial Design
Automotive Design(
Vehicle Design Process
Product Form and Aesthetics(
Participatory Innovation

23. **Purba Joshi**
Product Design
Computer aided Design
Form Design
Product Interface Design
Nature of material and processes

24. **Narayan Parasuram**
Sound Design
Music Appreciation
Designing Content for Children

25. **Pramod Khambete**
Interaction Design
Design Management

Centre of Studies in Resources Engineering

Introduction

The Centre of Studies in Resources Engineering (CSRE) was established in 1976 as a centre of excellence for advancing the frontiers of science and giving the country breakthrough technology and programmes for generating manpower in the area of Natural Resources Engineering. Since its inception, the centre has been actively involved in developing Remote Sensing Technology and its application to Natural Resources Management and Environmental Monitoring. The thrust areas at the centre (in alphabetical order) are: Agro-Informatics & Rural Development, Atmospheric Remote Sensing, Coastal & Marine Environment, Computer Vision & Graphics, Digital Image Processing, Digital Photogrammetry, Geographic Information Systems, Microwave Remote Sensing, Multimedia Educational Content Development, Natural Hazard Assessment and Mitigation, Snow, Avalanche & Glacial Studies, Terrain Evaluation and Water Resources Studies (Surface and Groundwater). The researchers come from diverse backgrounds of science and engineering. The centre currently has 14 faculty members.

Geoinformatics & Natural Resources Engineering is an interdisciplinary area – encompassing diverse issues of exploration and management of natural resources such as land, water, mineral, forest, soil and ocean resources; socio-economic aspects of sustainable development with respect to environmental impact of natural resources exploitation; renewable energy resources management; global warming and climate change. Contemporary techniques of scientific assessment using satellite remote sensing, GIS and GPS are evolved and used in the study of natural resources.

Infrastructural facilities have been further augmented with various sensors, distributed sensing devices, dedicated server, 3G Broadband Dongle, etc., to deploy Sensor Network and its application in the field of agriculture with Windows-and Linux-based centralized servers. Flux towers for energy balance studies and Field Twitter, a cost effective sensing device, are also available. E-Cognition Object Oriented Image Analysis software is added with 5-user license for M.Tech./Ph.D. work. ATCOR, atmospheric correction module is added to ERDAS software. The Coastal and Marine Environment Laboratory in CSRE is equipped with facilities to do analysis of marine water quality that includes a Multiparameter Sonde capable of instantaneous *in situ* water quality and analysis. The equipment needed for sampling of marine water at various depths as well as sediments are available in the lab.

Research Work is initiated in the areas of Development of Efficient Algorithms, Spatio Temporal Processes, Spatial Data Security Methods and Spatial Data Structures and Visualization Methods. Work is also initiated in Planetary Remote Sensing especially Geology of Mars using VNIR-SWIR and thermal remote sensing data (CRISM and THEMIS data). The key objective of the research is to identify and map hydrothermal minerals in Valles Marineris.

Academic Programmes

Students Intake:	
M. Tech	: 21
Ph. D.	: 12
Degrees Awarded	
M. Tech	: 09
Ph.D.	: 02

The centre offers M.Tech. and Ph.D. programmes in "Geoinformatics and Natural Resources Engineering". It has 54 Ph.D. students on its roll. B.Tech. (U.G. Minor Programme) in "Geoinformatics and Applications" and M. Tech. (institute elective) are also being offered. The centre has admitted 21 students for M.Tech. in GNR programme this year. The centre participates in the 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 areas of remote sensing, natural resources identification, development and management and spatial data base systems and applications. New research and development work is taken up in the area of virtual laboratory development to enable students from remote locations perform satellite image processing and analysis experiments.

The 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; Geosemantics, image information mining, cloud computing-based Geocomputations; and Bio-physical variables retrieval from remote sensing data

The centre 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

New Projects	: 02
Ongoing	: 10
Completed	: 04

New Projects:

"Microwave Remote Sensing and SAR Tutor with Virtual Laboratory", ISRO-IIT(B) Space Technology Cell.

"3D crustal modelling and resource potential mapping of deep-seated mineral deposits of the Aravalli province, Western Rajasthan", IRCC, IIT Bombay.

Ongoing projects:

"Virtual Lab for Satellite Image Processing and Analysis", MHRD sponsored project.

"Development of Methodology for snow pack characterization and glacier movement studies using multifrequency SAR time series satellite data.", Department of Science and Technology,

"Monitoring snow and glaciers of Himalayan region-Phase 2", Department of Space.

"Combining passive and active microwave observations for improving snow parameters estimation over Himalaya", DRDO, Dehradun.

"Development of Methodology for generation of high resolution digital terrain model and land/snow cover maps using airborne LIDAR and digital photogrammetric techniques", DRDO, Dehradun.

"Development of Land Parameter Retrieval Techniques and Tools for Polarimetric SAR Data Analysis", Space Application Centre, ISRO, Ahmedabad

"Elevation data information from Tandem-X experiment for updating the mass balance of some Himalayan glaciers in Bagha basin", DLR, Germany by providing 30 scenes of Tandem-X high resolution DEM free of cost for research work

"Mass balance studies of Himalayan glaciers using digital elevation models obtained through Cryosat-2", European Space Agency by providing 30 scenes of cryostat-2 satellite data free of cost for research work.

"Envisat ASAR data analysis for snow and glacier monitoring in India", European agency by providing unlimited number of satellite data at 10 percent cost for research work, 2005-2012.

"Snow and glacier characteristic and interferometry studies of Gangotri glacier region using TerraSAR-X", DLR Germany by providing 30 scenes of high resolution TerraSAR-X data for research work free of cost 2007-2012.

Completed Projects:

"Geo-ICT and Sensor Network Based DSS for Agriculture and Environment Assessment", DST and JST

"Development of Raster to Vector Conversion Software Tool", CAIR, DRDO, Bangalore

"Development and Execution of SAR calibration techniques", LRDE (Radar Development Establishment), DRDO, Bangalore

"Snow parameters estimation and monitoring of movement of the Gangotri glacier in Indian Himalayan region", JAXA, Japan, by providing 30 scenes of ALOS PALSAR and other sensor data like AVNIR, PRISM free of cost. 2007-2012.

Consultancy Projects:

Consultancy projects were received from several organizations such as DRDO, Dehradun, NIKO Resources, Bharat Petroleum Corporation Ltd, ONGC, Ahmedabad etc.

Consultancy Projects	:	12
Faculty Involved	:	08
Revenue Generated	:	134.86 lakhs

Extension Activities

The Centre organized "Geomatrix'12", an international conference on Geospatial Technologies and Applications, from 26th to 29th February 2012. It was the third in a series of conferences on geoinformatics tools, techniques and applications being organized by CSRE. A total of 156 papers were presented in 15 oral and 9 poster sessions. A total of 302 delegates attended the conference from all major institutions working in the field of geospatial technologies in the country, including IITs, ISRO, DRDO, NITs and other science and engineering colleges. Foreign delegates from Japan, USA, Canada, Australia, Germany, China and Iraq attended the conference. Eminent researchers from India and abroad delivered keynote addresses; the international partners of the conference were International Association for Mathematical Geosciences (IAMG), Mississippi State University, Centre for Exploration Targeting at the University of Western Australia, Edith Cowen University (Australia), and INRIA, the National Institute for Research in Computer Science and Control, France. The major Indian sponsors of the conference include DST, NATMO, ONGC, CIL and GENESYS.

Visitors to the Department

Dr. Ravi Anand, CSIRO, Perth Australia, Dr. I. Gonzalez-Alvarez, CSIRO, Perth, Australia, Dr. EJ Holden, University of Western Australia and Dr. A. Ford, University of Western Australia visited and given key note addresses and presentations at Geomatrix 12(Feb 26-29, 2012 and, also held discussions for possible Indo-Australian collaborations.

Prof. W.M. Boerner, Department of Electrical and Computer Engineering, UIC College of Engineering, USA, visited CSRE and delivered a seminar talk in Dec. 2011.

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

Adinarayana, J.
32nd International Conference Asia-Pacific Advanced Network (APAN) Consortium in New Delhi, India, 22-27 August 2011; *33rd International Conference Asia-Pacific Advanced Network (APAN)* Consortium in Chiang Mai, Thailand, 13-17.02.2012; *The Society of Instrument and Control Engineers (SICE) Conference Instrumentation, Control, Information Technology and System Integration*, 13-18.09.2011, Tokyo, Japan; CIGR *International Commission of Agricultural Engineering Conference (CIGR2011)* on *Sustainable Bio-Production : Water, Energy and Food*, 19-23.09.2011, Tokyo, Japan; *Information Technology Research Academy (ITRA) Strategy Formulation Meeting*, Delhi, 28-30.09.2011; and *3rd National Convention of Rural Institutes*, Allahabad, 24-25.11.2011.

Aher P. D, Adinarayana J and Gorantiwar S. D.
"Watershed Management Information System - A Conceptual Framework", *International Union of Geodesy and Geophysics Conference (IUGG 2011)*, 28th June – 7th July 2011, Melbourne, Australia.

"Use of Morphological Characteristics for Multi-Criteria Evaluation through Analytical Hierarchy Process for Prioritization of Watersheds", *International Conference on Geospatial Technologies and Applications (Geomatrix'12),* 26th - 29th February 2012, Indian Institute of Technology Bombay, Mumbai, India.

Hirafuji M, H. Yochi, T. Kura, K. Matsumoto, H. Nesumi, N. Hoshi, S. Ninomiya, J. Adinarayana, D. Sudharsan, Y Saito, K Kobayashi, T. Suzuki
"Ambient Sensor Cloud as A Solution of Practical Sensor Network in Agriculture", The Asia-Pacific Advanced Network is organizing *32nd International Conference Asia-Pacific Advanced Network (APAN) Consortium* in New Delhi, India during 22-27 August 2011.

Sudharsan D., J. Adinarayana, A. K. Tripathy, U. B. Desai, S. N. Merchant, K. Tanaka, S. Ninomiya, T. Kiura, M. Hirafuji, D. Raji Reddy, and G. Sreenivas.
"Dynamic and Real-time Monitoring of Regional Impact of Climate Change using Geo-ICT and Distributed Sensor Network System. Climate Engineering", *Second Transdisciplinary Summer School*. August 1-8, 2011, Banff, Canada.

Sawant S.A., Adinarayana J., Durbha S., Tripathy A.K. and Sudharsan D.
"Interoperable Service Oriented Wireless Sensor Networks in Agriculture", *International Conference on Geospatial Technologies and Applications (Geomatrix'12)*, 26th - 29th February 2012, Indian Institute of Technology Bombay, Mumbai, India.

Aiswarya K. P., Y. Bhavani Kumar, J. Adinarayana
"Convective Boundary Layer Height Determination uisng LIDAR", *International Conference on Geospatial Technologies and Applications, Geomatrix'12*, 26th - 29th February 2012, Indian Institute of Technology Bombay, Mumbai, India.

Sawant S.A., Adinarayana J., Durbha S., Tripathy A.K., Sudharsan D., Desai U.B., Merchant S.N., Ninomiya S., Hirafuji M. and Kiura T.
"Towards OGC Compliant Sensor Web and Modeling Service for Agriculture", *Asia Pacific Advanced Network 33rd Meeting Program*, 13-17 Feb. 2012, Chiang Mai Thailand.

A. Muhuri and A. Bhattacharya
"Statistical Modeling of Dual-band Quad-pol SIR-C SAR Image", *Geomatrix'12, International Conference on Geospatial Technologies and Applications*, 26-29 February 2012, Mumbai, India.

K. Datt and A. Bhattacharya
"Interpretation of Change in Quantization Level in ENVISAT ASAR Image using Grey Level Co-occurrence Matrix Elements", *Geomatrix'12, International Conference on Geospatial Technologies and Applications*, 26-29 February, 2012, Mumbai, India.

M. Sharma and N. Agarwal and A. Bhattacharya
"Speckle Filtering of SAR Images and a Comparative Analysis of Various Despeckling Techniques and a Proposed Filter", *Geomatrix'12, International Conference on Geospatial Technologies and Applications*, 26-29 February, 2012, Mumbai, India.

Dev. S.M.S.P, Lakhmani.R, and Khire M.V.
"Correlation Between Soil-Depth and Landform Attributes: A study from the Mumbai City", *'Geomatrix12'-International Conference on Geospatial Technologies and Applications*, IITB,Mumbai, 27-29 Feb,2012.

Nakil M.B., Khire M.V., Bhide D.D.
"Use of Spatially Corrected USLE Factors in Prediction of Soil Erosion from Catchment Area", *'Geomatrix12'-International Conference on Geospatial Technologies and Applications*, IITB,Mumbai, 27-29 Feb,2012.

Sathe, B.K., Khire, M.V., Sankhaua, R.S.
"Drainage Morphology Approach of Sub watershed in Krishna Basin using Spatial Technique", *XIth International Geography Conference*, University of Mysore from 22-24 Feb.2012.

"Design Flood Estimation of River Krishna – Koyna Confluence Basin Catchment area in Western Maharashtra Using Log Person Type III Distribution", *Int conf. on 'India Water WEEK -2012'* New Delhi, India, 10-14 March,2012 .

"Sustainable Development in Upper Krishna River Basin by Flood Control and Water Transfer Studies Approach", *3rd Int.Conf. on 'Climate Change and Sustainable Management of Natural Resources'* Gwalior, MP, India, 5-7 February, 2012.

Agarwadkar Y.Y.Y. , Khire M.V. ,Bhattacharya M., Azmi S., Apte M.
"Dynamic Allocation of Weightages for Desertification Analysis using Supervised Training Approach", *1st Conf. on 'Spatial Statistics'*, University of Twente, Enschede, The Netherlands, 2011.

Nagarajan, R.
34th International Symposium on Remote sensing of Environment, Sydney, 10-15th April, 2011, Australia.

Mohan, B. K.
Participated in the *Asian Conference on Remote Sensing* held at Taipei, Taiwan during 2-6 October 2011 and presented two papers "V-Sipal- A virtual Laboratory for Satellite Image Processing and Analysis" and "A Graph Based Approach to Segmentation of Remotely Sensed Images".

Presented a paper at *Geomatrix'12* held at IIT Bombay during 27-29 February 2012 on "A Modified Relaxation Labelling Algorithm for Post-Classification Refinement of High Resolution Remotely Sensed Images".

Venkataraman, G.
Participated in the *APSAR (The Asia-Pacific Conference on Synthetic Aperture Radar)* Conference organized by the Radar Society of KIEES, Seoul, Korea, 26-30 September 2011and presented the following paper. "Methodology Development for Snow Discrimination Using SAR Polarimetry Techniques" by G.Venkataraman, G. Singh, Y. Yamaguchi, S.-E. Park;

Participated in the *Second International Polarimetric SAR Workshop* in Niigata 2011 (POLSAR-WS'11) organized by Niigata University, IEEE GRS Japan Chapter, and URSI-F, Japan and in technical cooperation with IEICE SANE, Niigata, Japan, October 3-4, 2011 and presented the paper "Potential Assessment of SAR in Compact and Full Polarimetry Mode for Snow Detection" by Gulab Singh, Y.Yamaguchi, G.Venkataraman and S.E.Park.

Participated in the *MiniSAR workshop* in SAC, ISRO, Ahmedabad, Sept.15, 2011 and presented the paper

"Chandrayaan-1 MiniSAR data analysis for Lunar Polar region", by G.Venkataraman and G.Singh

Alok Porwal
Participated in the *Three-day Workshop on GIS-based Mineral Prospectivity Mapping* at the University of Western Australia, Perth, Australia (13-15 July 2011) and five-day *Workshop on Uranium Exploration* at the Beijing Research Institute of Uranium Geology, Beijing, China (1 - 5 Nov 2011)

Rao, Y. S.
Asia-Pacific Conference on SAR, Seoul, Korea, Sept. 26-30, 2011.

Sangita Zope Chaudhari and P.Venkatachalam
"Copyright Protection of Vector Geospatial Data using Digital Watermarking", *'Geomatrix12'-International Conference on Geospatial Technologies and Applications*, IITB,Mumbai, 27-29 Feb,2012.

Harini Arun, Deepak choksi, P.Venkatachalam
"An Algorithm to Convert Raster Images to Vector Data File Format", *'Geomatrix12'-International Conference on Geospatial Technologies and Applications*, IITB,Mumbai, 27-29 Feb,2012.

Rahul Dhamecha, P.Venkatachalam
"3.K Factor - Modified Standard Deviation Algorithm For Converting 16 Bit Images To 8 Bit", *'Geomatrix12'-International Conference on Geospatial Technologies and Applications*, IITB,Mumbai, 27-29 Feb,2012.

Sumeet Bhatia, Viral Vira, Deepak choksi, P.Venkatachalam
"An Algorithm for Dissolving Single and Multiple Connected Polygons", *'Geomatrix12'-International Conference on Geospatial Technologies and Applications,* IITB, Mumbai, 27-29 Feb,2012.

Arun Madan, P.Venkatachalam
"Spatial Temporal Data Mining For Meteorological Applications", *'Geomatrix12'-International Conference on Geospatial Technologies and Applications,* IITB, Mumbai, 27-29 Feb, 2012.

Pandey, P., Venkataraman, G., Shukla, S.P.
"Study of Retreat of Hamtah Glacier, Indian Himalaya, using Remote Sensing Technique", 2011 *IEEE International Geoscience and Remote Sensing Symposium, IGARSS 2011*; Vancouver, BC; 24 July 2011 through 29 July 2011; Category number CFP11IGA-ART; Code 87257.

Pratima Pandey, G. Venkataraman, Farjana Birajdar
"Comparative Study of Different Remote Sensing Data for Glacier Area Estimation", *Geomatrix'12*, IIT Bombay, February 27-29, 2012, February 27-29, 2012

Farjana Birajdar, Mustaq Shaikh and G.Venkataraman
"Change Detection of Kelas Buk Glacier of Himalaya Region using Active and Passive Remote Sensing Data", *Geomatrix 2012*, Indian Institute of Technology Bombay, February 27-29, 2012.

"Remote Sensing Based Glacier Lake Inventory Of Chandra-Bhaga Basin Of Himalaya Region", Andhra Pradesh Geographical Society, Hyderabad 2012.

Mustaq Shaikh, Farjana Birajdar and G.Venkataraman
"Glacier terminus fluctuation of Panchi nala glacier of Himalaya region", *"Geomatrix 2012"*, IIT Bombay, February 27-29, 2012.

Pratima Pandey, G. Venkataraman
"Application of Remote Sensing Data for Glacial Studies – An Overview", Bangalore, *National Seminar-2012,* Karnataka State Remote Sensing Applications Centre, January 18-19,2012.

Farjana Birajdar, G. Venkataraman
"Remote Sensing and GIS Applications in Monitoring of Bhaga Basin Glaciers of Himalaya region", Karnataka State Remote Sensing Application Centre , Bangalore 2012.

"Remote Sensing and GIS Applications in Monitoring of Himalayan Glaciers"., Indian Society of Remote Sensing, Bhopal 2011.

Farjana Birajdar, Gopinadh Rongali, P. Narvekar, Snehmani, G. Venkataraman,
"Scaling issues in correlating Ground based and satellite based observations over Himalayan regions", Snow & Avalanche Study and Establishment, Manali 2012.

Mustaq Shaikh, Farjana Birajdar and G.Venkataraman
"Glacier monitoring using Topographical map, DEM and Remote Sensing Data", Snow & Avalanche Study and Establishment, Manali 2012.

G. G. Ponnurangam and Y. S. Rao
"Soil Moisture Mapping using Fully Polarimetric SAR Data", presented at *symposium of ISRS* held at Bhopal during Nov 9-11, 2011.

G. G. Ponnurangam, Y. S. Rao, Shiv Mohan and Anup Das
"Soil Moisture Estimation using Fully Polarimetric RADARSAT-2 data", *presented at Geomatrix'12* held at IIT Bombay during Feb 26 - 29, 2012.

Conferences /Symposia/Workshops/ Seminars(Coordinated/Chaired by Faculty)

Alok Porwal
Convener for the International Conference on 'Geospatial Technologies and Applications', "Geomatrix12" organized in CSRE during 26 – 29 February, 2012.

Adinarayana, J.
Co-organizer, Agriculture Working Group Session for *APAN- 32nd Conference on Impacts of ICT on Rural and Agricultural Development*, 22-26 August 2011, New Delhi, India

Co-organizer for Agriculture and Sensor Network Groups Sessions on "Sensor Network and its applications in ASIA-Pacific region", *APAN- 33rd Conference*, held on 13-17 February 2012, Chiang Mai, Thailand

Co-convener for *International Conference on Geospatial Technologies and Applications (Geomatrix'12)*, 26 - 29 February 2012, IIT Bombay.

Rao, Y.S.
Organised a two-day *Indo-Japanese Workshop on SAR Data Processing and Applications*, Nov. 21-22, 2011

Mohan, B. K.
Conducted 5-day *QIP Short Term Course on Satellite Image Processing and Analysis* in CSRE during July 2-6, 2011 supported by CEP/QIP Cell of IIT Bombay, attended by 29 college teachers from across the country.

Invited Lectures

Adinarayana, J.
"GeoSense: Geo-ICT and Sensor Network based Decision Support System for Agriculture and Environment Assessment", National Agricultural Research Center/NARO, Tsukuba, Japan (15.09.2011)

"Advances in Geo-Informatics: Static to Real-time Systems for Natural Resources Management", N V Patel College of Pure and Applied Science, Vallabh Vidyanagar, Anand, Gujrat (07.01.0212)

"Geo-ICT and Sensor Network in Agriculture", National Institute of Rural Development (NIRD), Hyderabad (20.05.2012)

"Geo-ICT in Watershed Development Planning", National Institute of Rural Development (NIRD), Hyderabad (05.01.2012)

"GeoSense: Geo-ICT and Sensor Network based Real-time Decision Support System", Bharat University, Chennai (09.09.2011)

Rao, Y.S.
"SAR polarimetry", Hongik University, Seoul Korea, Sept. 25, 2011

"Polarimetry and Interferometry for Various Applications" at *Geomatrix-12*, *DRDO-Academia Workshop* on Feb 16, 2012 on Feb. 226-29, 2012.

"SAR Signal processing and SAR polrimetry", at Centre for space science and technology education in Asia and the Pacific, Dehradun, April 4-20, 2011

"Synthetic Aperture Rardar – remote sensing", at Dept. Aeronautical Engineering, Petroleam University, Dehradun.

Mohan, B. K.
"Pattern Recognition" at K.J. Somaiya College, Mumbai on March 30, 2012

"Hyperspectral Image Processing" *Short Term Course Hyperspectral 2011* conducted in Department of Earth Sciences, IIT Bombay on 13 November 2011

"Satellite Image Processing and Classification" at SGGS Institute of Engineering and Technology, Nanded on December 15, 2011.

Venkataraman, G.
"Synthetic aperture radar application in snow studies" at Divecha Centre for Climate Change, Indian Institute of Science, Bangalore, India under *Training on snow studies, climate change and remote sensing* in 12-23 December 2011

"Synthetic aperture radar application in snow studies" at Karnataka State Remote Sensing Application Centre (KSRSAC), Bangalore in 18-20 January 2012.

Venkatachalam, P.
Key note address on "Geospatial Technologies for Rural Development" in the *National Workshop on GIS Application in Watershed Development* on Jan 7th 2012 at NIRD, Hyderabad.

"GIS Application for Coastal Management" in the *QIP/ CEP Course on Coastal Processes and Modelling* on March 22nd 2012 at IIT Bombay

"The Role of Technology in Crime and Crime Prevension" in the *CEP course for IPS Officers* on on November 17th 2011 at IIT Bombay.

Surya Durbha
Delivered guest lecture at Indian Institute of Remote Sensing (IIRS) , Department of Space, Dec 2011

Significant Awards and Distinctions

Adinarayana, J.
Vice-Chairman, Agriculture Working Group, Asia-Pacific Advanced Network (APAN)
Vice President, Asian Conference for Information Technology in Agriculture (AFITA) (2012-2014).
Editorial Member, Bulletin of Environmental and Scientific Research Journal

Venkatachalam, P.
Best Oral Paper Presentation prize in GIS Geomtrix 12 International Conference in February 2012 at IIT Bombay for the paper by Sangita Zope Chaudhari and P.Venkatachalam entitled "Copyright Protection of Vector Geospatial data using Digital Watermarking".

Alok Porwal
Awarded Adjunct Associate Professorship at the WH Bryan Mining and Geology Centre, University of Queensland, Brisbane, Australia

Surya Durbha
Member, Board of Studies, Indian Institute of Remote Sensing (IIRS), Department of Space, Dehradun.

Honorary Work

Adinarayana, J.
Journal Reviewer for Computers and Electronics in Agriculture – Elsevier

Venkatachalam, P.
Member, Editorial Board, Indian Journal of Geomatics

Mohan, B.K.
Peer reviewed papers submitted for publication in IEEE Geoscience and Remote Sensing Letters, International Journal of Remote Sensing, Indian Journal of Remote Sensing, IEEE Geoscience and Remote Sensing Symposium 2012

Shyamalee Mukherji
Reviewed 14 papers for the IEEE International Geoscience and Remote Sensing Symposium, Munich, July 2012.

Surya Durbha
Reviewed Manuscripts for Journals IEEE Transactions on Geoscience and Remote Sensing, International Journal of Image and Data Fusion, International Journal of Photogrammetry and Remote Sensing, Computers and Electronics in Agriculture, IEEE Geoscience and Remote Sensing Letters and IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing

Reviewed Conferences papers for 2011 International Workshop on Spatial and Spatiotemporal Data Mining (SSTDM-11) and Program Committee Member for GeoMatrix 12 conference and 2011 International Workshop on Spatial and Spatiotemporal Data Mining (SSTDM-11).

Rao, Y. S.
Reviewed M.Sc. thesis evaluation of students of IIRS, March 2011 and M.S. thesis review of IIT Madras.

Faculty Members and Their Specialization

1. (Ms.) P. Venkatachalam
Development of Efficient Algorithms, Dynamic Models, Multi Dimensional Data Handling and Spatial Data Visualization for GIS Systems - Software Development and Remote Sensing.

2. Alok Porwal
GIS-based mineral prospectivity modelling, Mineral systems studies and resources exploration, Optical and thermal remote sensing, Imaging spectroscopy, Planetary remote sensing

3. J. Adinarayana
Agro-Informatics and Rural Development

4. S. S. Gedam
Stereo Image Processing and Digital Photogrammetry, Remote Sensing and GIS Applications (Surface Hydrology, Urban Infrastructureetc.,) Global Positioning Systems and applications.

5. A. B. Inamdar
Coastal and Marine Environmental applications of RS & GIS

6. M.V. Khire
Terrain evaluation, Landuse Planning, Wasteland Development, Monitoring Desertification and Run-off Estimation

7. B. Krishna.Mohan
Satellite image processing and analysis Multimedia educational content development for geoinformatics

8. M. V. R. Murti
Remote Sensing of Atmosphere and Trace gases; Spectroscopic Analysis of Planetary Materials, Instrumental Analysis of XRF, XRD, AAS and ICP-AES.

9. R. Nagarajan
Remote sensing and GIS applications to Natural Hazards-Landslides and Drought

10. Y. S. Rao
DEM Generation using Radar Interferometry(InSAR) Technology applications.

11. Shyamalee Mukherji
Computational Methods, Computer Vision and Graphics.

12. G. Venkataraman
Spatial Modelling for Mineral Exploration, Microwave Remote sensing to the study of Glacier

13. Surya Durbha
Geosemantics, knowledge-based systems, image information mining, cloud computing-based Geocomputations, Geospatial standards, Interoperability, sensor webs, Critical Infrastructure Protection, Remote sensing, Bio-physical variables retrieval from remote sensing data

14. Avik Bhattacharya
Microwave Remote Sensing

Ctara Centre for Technology Alternatives for Rural Areas

Introduction

CTARA's activities include academic programmes (M.Tech, Ph.D. and TDSL) and R&D projects. CTARA also focuses on field experimentation and associations with both governmental and non-governmental community-based organisations. CTARA is headed by Prof. Milind Sohoni and has three core faculties, namely, Prof. Narendra Shah, Prof. N.C.Narayanan and Prof. Anand Rao. CTARA has continued with the appointments of Prof. Prasad Modak, Prof. Subodh Wagle and Prof. Satish Agnihotri as Adjunct Professors and Prof. Bakul Rao as Adjunct Associate Professor. Apart from the core and adjunct faculty, CTARA has been enthusiastically supported by its associated faculty, including Prof. A.W.Date, Prof. U.N. Gaitonde, Prof. J. Adinarayana, Prof. Om Damani, Prof. K. Narayanan, Prof. Ramesh Bairy T. S. Prof. Anand Patwardhan, and Prof. H.N.Narayanan.

Academic Programme

CTARA's fifth batch of 12 students pursuing M.Tech. (Technology and Development) was inducted in July 2011. Nine degrees were awarded to the outgoing third batch of 2009-11. The fourth batch successfully completed 10-week field work in different parts of the country, including Madhya Pradesh, Kerala, Uttaranchal. CTARA admitted 6 Ph.D. students during 2011-12. CTI-USA committed to provide fellowship to one M.Tech. student joining CTARA for 2011-13.

CTARA's T&D Supervised Learning (TDSL) courses TD 390, TD 490 and TD 491 for the B.Tech. have been registered by more than 50 students which is much higher than the number of students who registered for these courses (31) in 2010-11.

Degrees Awarded	
M.Tech.	: 9

R & D Activities

The main thrust areas of R & D activity in CTARA include Appropriate Technology, Agro-Food Industrial Development, Climate Change, Water and Sanitation, Policy and Governance, Environmental Policy and Management, Field Assessments and Remediation, Matrix Characterization, Evidence-based Policy Advocacy, Food and Nutrition, Woman and Child Health, Pedagogy of Engineering.

Part of the R & D activities also includes 'Stakeholders Day' where the students, staff and faculty presented the output of their work to public, NGO, government authorities. CTARA organised its second 'Stakeholders Day' on November 8, 2011, which focused on the Sugave Rural Drinking Water Scheme (of Karjat taluka, Raigad district) and reasons for its poor performance. Among the stakeholders were Shri Jayant Patil, State Minister of Rural Development; Shri Sudhir Thakre, Secretary, Department of Rural Development; Shri Abhijit Bangar, CEO of Raigad District ZP; Engineers from Maharashtra Jeevan Pradhikaran (MJP); Disha Kendra (local NGO); Faculty from the Konkan Gyanpeeth Engineering College, Karjat; and Sarpanch and villagers of the Borivali Group Gram Panchayat. The activities of the 'Stakeholders Day' were presented by Pooja Prasad, Research Coordinator, and Nikhil Goyal, TDSL student.

Sponsored Research Projects

A total of 10 sponsored research projects were carried out in 2011-12 of which four were completed. Following are the lists of completed and on-going projects:

Sponsored Research Projects	**: 10**
Ongoing	: 6
Completed	: 4

Completed Projects

"Global Energy Assessment" by International Institute for Applied Systems Analysis

"Occurrence and Impacts of Climate-Related Natural Hazards Contract" by Ministry of Environment and Forests, Govt. of India.

"Evaluation of the Responsible Tourism Initiatives of Kerala Tourism" by Department of Tourism, Govt. of Kerala, India.

"Occurrence and Impacts of Climate-related Natural Hazards" by Ministry of Environment and Forests, Govt. of India.

Ongoing Projects

"Process Improvements and Technology Dissemination in Jaggery Making" by RGSTC, Govt. of Maharashtra

"Biochemical and Nutritional Characterization of Tender Coconut Water and its Shelf-life Extension" by Healthcare Initiative, IRCC-IIT Bombay

"Rural Technology Action Group (West Zone)" by Office of Principal Scientific Advisor, New Delhi

"Production and Use of Medical Nutrition Theraputic Foods in Clinical Trials for Malnourished kids at Sion Hospital" by Toddler Food partners, US NGO, MN, USA

"Demonstration and Assessment of Economic Viability of New Energy Efficient and Less Polluting Brick Making Technology (Vertical Shaft Brick Kiln)" by RGSTC, Govt. of Maharashtra

"Ganga River Basin Management Plan (Policy, Law and Governance Group)" by Ministry of Environment and Forests, Govt. of India.

Research Reports

Narayanan, N. C.

Evaluation of the Responsible Tourism Initiatives in Kerala. Submitted to the Department of Tourism, Government of Kerala, 2011

Assessment of Public Consultation Process for Environmental Clearance of Hydropower Projects in Upper Ganga Segment. Submitted as part of the GRBMP second set of final draft reports to the NGRBA, MoEF, 2011.

Mapping of Policy Instruments and Governance Agencies for Environmental Clearance of Hydroelectric Projects in Upper Ganga. Submitted as part of the GRBMP second set of final draft reports to the NGRBA, MoEF, 2011.

Policy and Governance Perspective and Framework. Submitted as part of the GRBMP second set of final draft reports to the NGRBA, MoEF, 2011.

Viewing Pollution of Ganga by Sewage from Kanpur from Policy and Governance Perspective:Analysis, Policy and Institutional Recommendations. Submitted as part of the GRBMP second set of draft reports to the NGRBA, MoEF, 2011.

SWOT Analysis of Ganga Action Plan. Submitted as part of the GRBMP second set of draft reports to the NGRBA, MoEF, 2011.

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

Narayanan, N. C.

Coordinated a 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, held on April 30, 2011, at IIT Bombay, Mumbai.

"What ails Vembanad ?: Scope and Constraints of Intermediate Institutions for Lake Governance", *International Workshop on Waterways*, held during September 21-23, 2011 at Kumarakom, Kerala.

"Water Reforms in a Comparative Perspective: Case of two Water and Sanitation Projects from India and Sri Lanka*", Session on 'Currencies of Globalisation' in the 'Comparative Water Studies Conference in Centre for Development Research (ZEF)*, held during January 20-21, 2012, at Bonn, Germany.

"Paradigm Shifts in Water Governance in South Asia", *Brown Bag Seminar Series in World Trade Institute (WTI)* held on January 13, 2012, at Bern, Switzerland.

"A Critical Review of Ganga Action Plan from a Policy and Governance Perspective", *Workshop on Integrated Management of International Rivers in Response to Climate Change,* organized by the Monash Sustainability Institute, Monash University, held during June 20-24, 2011, at Melbourne Museum, Melbourne.

"Challenges of Developing the Ganga Basin Management Plan and a Preliminary Analysis of Two Concerns", *Workshop on Integrated Management of International Rivers in Response to Climate Change,* organized by the Monash Sustainability Institute, Monash University, held during June 20-24, 2011, at Melbourne Museum, Melbourne.

Rao, A. B.

Workshop on *Geoengineering: Science, Ethics, Politics and Governance,* held on September 20, 2011 at the India Habitat Centre, Magnolia Hall.

Carbon Capture and Storage (CCS) Workshop, held on September 27, 2011 at New Delhi.

"*CO_2 Capture and Sequestration (CCS)*", *Indo-German Frontiers of Engineering Symposium 2010* held during June 24-27, 2010, at Potsdam, Germany.

"A Comparative Study on Household Level Technologies for Treating Drinking Water", presented at *National Conference in DACON-2012* organized by South Indian Education Society, Mumbai in association with Indian Desalination Association in Mumbai, February 8-9, 2012.

Rao, B. R.
"A Comparative Study on Household Level Technologies for Treating Drinking Water", *National Conference on Water Purification Technologies and Management*, held during February 8-9, 2012, Mumbai,

"Choice of Technology for Municipal Solid Waste Management for Local Self Government Bodies using MCDM tools- A case study of Kerala, India", *The 27th International Conference on Solid Waste Technology and Management*, held during March 11-14, 2012, Philadelphia, PA, USA.

"Choice of Technology for Municipal Solid Waste Management for Local Self Government Bodies using MCDM tools- A case study of Kerala, India", *The 27th International Conference on Solid Waste Technology and Management*, Philadelphia, PA, USA, March 11-14, 2012.

Shah, N. G.
"Bio-diesel Making from Waste Vegetable Oils: A Case Study of Lab to Plant Technology Transfer", *Indo-Canadian Bilateral Workshop on Management and Valorisation of Industrial and Agricultural Wastes (MVIAW 2011),* held on October 12, 2011, IIT Bombay.

"Controlled Atmosphere (CA) Storage for Fresh and Processed Foods", *International Conference. ICPPA-2012,* held on March 31, 2012, MG University, Kottayam, Kerala,

"CA-MA Packaging and Storage for Fresh and Processed Foods", *INDO-AFRICA Workshop,* held on February 2, 2012, Mumbai.

"Techno-Economic Feasibility of Making Indigenous Nutrition Products to Combat Malnutrition in Children", *16th World Congress on Clinical Nutrition*, held during September 12-14, 2011, New Delhi.

"Assessment of Sustainability of Organic farming in India using AHP", *17th Annual International Sustainable Development Research Conference*, Columbia Univ, New York, USA, May 8-11, 2011.

"Soil Fertility: Can We Estimate ? Assessment of Techniques of Soil Fertility Measurement", *International Conference on Innovative Techo-Management Solutions for Social Sector*, Kolkata, January 17-18, 2012.

"Assessment of Sustainability of Organic farming in India using AHP", *17th Annual International Sustainable Development Research Conference*, Columbia Univ, New York, USA, May 8-11, 2011.

"Soil Fertility: Can We Estimate ? Assessment of Techniques of Soil Fertility Measurement", *International Conference on Innovative Techo-Management Solutions for Social Sector*, Kolkata, January 17-18, 2012.

Invited Lectures

Rao, A. B.
"Defining Energy Futures in India and Canada", *Energy, Poverty and Development* – Invited seminar as part of the CEP, IIT Bombay, May 25, 2011.

"Climate Change and Clean Development Mechanism", *CEP on Energy Management* organized at IIT Bombay, November 25, 2011.

"Energy, Equity and Environment" Workshop on *Energy Research for Global Sustainability,* organized by the Global Alliance Partners, IIT Bombay, December 7-8, 2011.

"Carbon Capture and Storage (CCS) in India", invited as a panelist to participate in the Consultative Workshop, organized by TERI, with support from the Global CCS Institute, New Delhi, January 25, 2012.

"Kyoto Protocol and its History" and moderated the debate among 6 teams representing 6 different nations/ block of nations during an event "Sustainability - A Democratic Path towards It", organized by the Energy Club, IIT Bombay, February 3, 2012.

Rao, B. R.
"Remediation of Contaminated Soils and Aquifers Hazardous Waste Management for Andhra Pradesh Pollution Control Board", *Continuing Education and Quality Improvement Programme,* CESE, IIT Bombay, April 11-14, 2011

Significant Awards/Distinctions

Narayanan, N. C.
"Visiting Fellowship", University of Lausaane (UNIL), Switzerland, 2011-12

"Australian Leadership Awards (ALA) Fellowship" Monash University, Australia, June 2011.

Faculty Members and their Specializations

1. **A.W. Date**
   Heat Transfer, Thermodynamics and Energy Conversion, Energy Systems, Appropriate Technology

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

8. **Satish Agnihotri**
   Policy and Governance, Evidence based policy advocacy, Food and Nutrition, Woman and Child Health

9. **Milind Sohoni**
   Drinking water-rural and urban, groundwater and waterhed modelling. Pedagogy of Engineering

Centre for Formal Design & Verification Software

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

The importance of formal methods based software engineering in design and verification of safety critical software was the primary inspiration behind DAE's establishing the Centre for Formal Design and Verification of Software (CFDVS) through BRNS, and in collaboration with IIT Bombay and TIFR. CFDVS started functioning more than a decade back, in 1999. Although the initial focus of the centre was on design and verification of software, it was quickly realized that the scope of activities needed to be expanded to include both software and hardware systems, in order to provide a comprehensive approach to design and verification of safety-critical systems. Over the past 13 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 programmes 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 13 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.

The student strength (at M.Tech and Ph.D. levels) in CFDVS has grown to very healthy numbers over the years. Over the last 13 years, 12 Ph.D. students have worked/are still working on their doctoral dissertation at CFDVS. Of these, five Ph.D. students have already graduated, one student has submitted his dissertation, and one 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.

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, Technical University of Catalunya at Barcelona, National University of Singapore, Stanford University, Google, Intel, Motorola Laboratories at Adelaide, IRST at Trento, Texas Instruments India at Bangalore, etc.

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

Research Projects (Ongoing)

- Development of ACE II
- CESE : A Visual Formalism for Specification and Verification of SoCs
- VEDAC and EXPERT : Modeling and Verification Tool-sets 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

Consultancy/Sponsored Projects

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

Ongoing Sponsored Project:

- "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
- "Analysis of SCADE Lusture Models : Runtime Monitoring and Testing", sponsored by BRNS, Mumbai
- "Development of Techniques and Tools for Formal Verification of Computer Systems with Improved Precision and Scalability", sponsored by BRNS, Mumbai

Project Under Discussion

"Formal Verification of Hardware Modules in ANAIO FPGA", sponsored by Bhabha Atomic Research Centre, Mumbai

Centre Staff

Participating Faculty:

1. **Prof. 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.

3. **Sridhar Iyer**, CSE Dept.
   Distributed Systems; Mobile computing; concurrency Analysis

4. **S. Biswas**, CSE Dept
   Parallel and distributed Processing, Neural Nets, Architecture

5. **Sanyal**, CSE Dept.
   Functional Programming, Compilers and programming languages

6. **U. Khedker**, CSE Dept.
   Programming Languages Compilers, data flow analysis

7. **Kavi Arya**, CSE Dept.
   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)
   Design, Specification and Verification Real-Time programs, Synchronous Programming Languages, Hybrid Systems, Concurrent Process Calculi, Concurrent Constraints, Logic Programming, Mobile Computing, Formal Methods, Distributed Computing, automated reasoning.

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.

Centre for Research in Nanotechnology and Science

Introduction

Centre for Research in Nanotechnology and Science (CRNTS) has been the nodal point wherein the efforts of about forty 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 faculties of different departments as well as interdisciplinary research in Nano sciences and technology.

A new Ph.D. programme in Nanotechnology had been initiated during the year 2008-09. Following this, Ph.D. 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.

Sophisticated Analytical Instrument Facility (SAIF)

From its inception in 1976, the 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 Department of Science and Technology, new sophisticated analytical instruments have been added to the centre at regular intervals to keep up with the ever developing research and advanced technology. One additional state-of-the-art facility, viz., HR-LCMS (High Resolution Liquid Chromatograph Mass Spectrometer), will be added in the year 2012.

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. Large numbers of students and faculties at IIT Bombay extensively use SAIF facilities for their research work. The centre has provided facilities for the analysis of 22569 samples during the year 2011-12. The value of services provided is Rs.1,66,00,459/- with concession and Rs. 5,82,67,131/- without concession. The contribution of SAIF to the various categories of users from IIT Bombay is given in Table-1 along with the value of services provided. Table 2 provides information on samples analysed during the year 2011-12 and the earnings accrued to SAIF from external users.

The Department of Science & Technology continued to support SAIF facilities by providing, financial support of Rs. 3,48,07,000/- for procurement of state-of-the-art facilities

Table 1 : Contribution of SAIF to Academics at IIT Bombay
(01-Apr-2011 To 31-Mar-2012)

Sr No.	Course	No. of Users	No. of Samples	Charges (Rs.)	As per Industry Charges (Rs.)
1	B.Tech.	3	17	14700	58800
2	Dual Degree Programme	29	267	262765	1051060
3	M.Sc.	20	165	79810	319240
4	M.Tech.	85	832	767435	3069740
5	Ph.D.	353	9519	7713640	30854560
6	Other (Faculty/Project Staff)	35	369	348565	1394260
	Total	**525**	**11169**	**9186915**	**36747660**

Sample Analysed Information (External+Internal)
Period : (01-Apr-2011 To 31-Mar-2012)

Sr No.	Instrument	No. of Users	No. of Internal Samples	No. of External Samples	No. of Samples	Internal Charges (Rs.)	External Charges (Rs.)	Charges (Rs.)
1	**CHN**	122	248	827	1075	130000	1290349	1420349
2	**DSC**	0	0	0	0	0	0	0
3	**ESEM**	29	136	0	136	66250	0	66250
4	**ESR**	79	24	828	852	3600	165405	169005
5	**FEG-SEM**	336	3060	624	3684	2711400	497370	3208770
6	**FEG-TEM**	203	2082	0	2082	3611630	0	3611630
7	**FTIR**	88	1115	36	1151	143300	6954	150254
8	**FTIR-IMG**	109	249	912	1161	58625	241318	299943
9	**GC-HRMS**	72	50	323	373	31000	237670	268670
10	**GCMS**	42	2	207	209	1000	158960	159960
11	**IAS**	23	187	69	256	23250	13225	36475
12	**ICP-AES**	162	1650	2807	4457	555035	630028	1185063
13	**LCMS**	124	108	756	864	66000	797344	863344
14	**LRS**	86	744	95	839	689000	118221	807221
15	**NMR**	212	477	1710	2187	253390	1249585	1502975
16	**SIMS**	36	127	50	177	144000	74801	218801
17	**TEM**	316	628	1662	2290	485150	1616399	2101549
18	**TG/DTA**	83	163	398	561	128700	234418	363118
19	**XRF**	41	119	96	215	85585	81497	167082
	Total	**2163**	**11169**	**11400**	**22569**	**9186915**	**7413544**	**16600459**

NOTE: 75% discount for University/Educational Institute
40% discount for Research Institute

Figure 1 : Samples analysed in different categories
Period : (01-Apr-2011 To 31-Mar-2012)

Internal IITB	University	National Lab	Large Scale Industry	Total
11169	9605	876	919	22569

Figure 2 : Amount Charged with concession to various users during 2011 -12 (Rupees)
Period : (01-Apr-2011 To 31-Mar-2012)

Internal IITB	University	National Lab	Large Scale Industry	Total
9186915	4495738	928070	1989736	16600459

Figure 2 : Amount Charged without concession to various users during 2011 -12 (Rupees)
Period : (01-Apr-2011 To 31-Mar-2012)

Internal IITB	University	National Lab	Large Scale Industry	Total
36747660	17982952	1546783	1989736	58267131

Table 2: Samples Analysed
(01-Apr-2011 To 31-Mar-2012)

Annual Internal External Report				
Type	Users	Samples	Charges	Actual Charges
Internal	525	11169	9186915	36747660
External	1638	11400	7413544	21519471
Total	2163	22569	16600459	58267131

Department Wise Total Internal Charges

Period : 01-Apr-2011 To 31-Mar-2012

Sr No.	Department	No. of Users	No. of Samples	Internal Charges (Rs.)	As per Industry Charges (Rs.)
1	Aerospace Engineering	3	15	9250	7000
2	C.E.S.E.	15	108	67575	270300
3	Chemical Engineering	56	1481	1114230	4456920
4	Chemistry	86	936	650795	2603180
5	Civil Engineering	12	614	248255	993020
6	Corrosion Science & Engineering	3	106	41400	165600
7	C.R.N.T.S.	23	1077	893965	3575860
8	C.T.A.R.A.	1	5	5000	20000
9	Earth Sciences	29	465	299725	1198900
10	Electrical Engineering	25	211	187565	750260
11	Energy Science & Engineering	40	1140	1117660	4470640
12	Mechanical Engineering	31	288	226175	904700
13	Met.Engg & Mat.Science	116	2666	2433835	9735340
14	Physics	43	904	945090	3780360
15	Reliability Engineering	1	1	1550	6200
16	School Of Bio-Science & Bio Engineering	40	1152	944845	3779380
	Total	**524**	**11169**	**9186915**	**36747660**

R & D Activities

Sponsored Research Projects

Ongoing Projects:
"Development and Characterization of Nano-phosphors for strategic applications" PI: Mayuri N. Gandhi, Co. PI: Ajit R. Kulkarni, funded by DRDO.

Consultancy Projects:
"Analysis and Process modification of CETP" at Ankleshwar Sponsored by (Funded by) Enviro Technology Ltd., PI: Dr. C.S. Harendranath

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

Adersh Asok, Mayuri N. Gandhi and Ajit R. Kulkarni
"Processing of highly luminescent biocompatible quantum dot phosphors with tunable visible emission via defect and bandgap engineering", presented in *International Conference on Nanoscience and Technology (ICONSAT)*, January-2012

Extension Activities

Workshop on Advanced Analytical Techniques

A 4-days workshop at SAIF on *Advanced Analytical Techniques* (ICP-AES-MS/GC-LC-MS/FTIR-Imaging/TEM/SEM/EPMA) was held at SAIF, IIT Bombay during 26th – 29th March 2012. The workshop was aimed at promotion and familiarization of some of the recently acquired analytical instrumental techniques at SAIF. The workshop focuses in particular on a number of lectures held during morning sessions and laboratory demonstrations held in the afternoon session on all four days. A total of 90 participants registered and attended the workshop of which 30 were from all over India and 60 were from Internal IIT Bombay. The workshop was much appreciated by the participants.

Workshop on Electron Microscopy

A 3-day workshop at SAIF on *Electron Microscopy* was held at SAIF, IIT Bombay, during 25th March – 27th April 2011. A total of 114 participants registered and attended the workshop, of which 32 were from all over India and 82 were from inside IIT Bombay. The workshop was much appreciated by the participants.

Industrial Engineering & Operations Research

Introduction

Industrial Engineering and Operations Research is involved in teaching and research broadly in the areas of decision-making in operational as well as strategic contexts. An interdisciplinary programme, IEOR aims to have a healthy mix of theory and applications including modelling and computations. Methodological areas include Optimisation, Stochastic Models, Stochastic Control, Simulation, System Dynamics, Game Theory, Artificial Intelligence, Statistical Techniques. Application areas include engineering as well as service and infrastructure systems like Logistics & Supply-chain management, Transport, Communication networks, Finance, Quality & Operations management. Faculty members and students have diverse background with degrees in various disciplines of engineering and science. The group presently has five core faculty members, and, together with other institute faculty members 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.

IEOR has been offering M.Tech. and Ph.D. programmes since its inception, and from 2009 it has started an M.Sc.-Ph.D. dual degree progamme in Operations Research.

Academic Programmes

IEOR offers M.Tech. and Ph.D. degrees and an M.Sc.-Ph.D. dual degree. The current strength of Ph.D. students is 15, and is on the rise in the last two years. The M.Sc.-Ph.D. dual degree programme, started in 2009-10, now has 22 students on roll. The M.Tech. programme has a total strength of 32 students. IEOR is also participating in the IITB-Monash Academy Ph.D. programme, with four doctoral students in the joint programme.

The Ph.D. level course, *IE802: Topics in IEOR* was offered in Autumn 2011-12, with focus on Queueing Theory. IEOR continues to contribute to UG/PG teaching with a significant number of students from other departments opting for IE-labeled courses as electives.

Degrees Awarded in 2011-12

M.Tech.	:	14
Ph.D.	:	1

R&D Activities

The R&D activities of the IEOR group span a variety of areas ranging from optimization to simulation and scenario analysis. The supporting agencies range from government departments, research labs, private industry and private institutions.

Sponsored Research Projects

Project Title	Sponsoring Agency	Status
"Comprehensive Assessment of Rail Facilities and Requirements forBangalore City"	RITES Limited, Hyderabad.	Initiated
"Second Generation Area Traffic Control System (CoSiCoSt2G)"	Department of Information Technology	Initiated
"Evaluation of Options for Sizing of Commercial Aircraft"	National Aerospace Laboratories, Bangalore	Completed Project
"Markov Decision Processes and Stochastic Games"	IRCC, IIT Bombay	Completed Project

Consultancy Projects

Apart from ongoing projects, IEOR undertook one new project which led to a revenue earnings of Rs 5,51,000. Two projects initiated earlier were completed during the year.

Extension Activities

IEOR organized the First International Simulation Conference of India (2012) during 2nd-4th February 2012 at VMCC, IIT Bombay. There were about 175 participants from 71 different organizations in the conference, including industry professionals, researchers, and students. IEOR also conducted a two-day Symposium on Optimization and Control on 21st-22nd February 2012 at IIT Bombay. There were six invited talks at the symposium with focus audience being the faculty, researchers, and students of IIT Bombay. Also, Prof. Hemachandra conducted a CEP session as part of the course "Advanced Power System Analysis" for researchers and engineers from CDAC and Intel.

Visitors to the Department

Mr. Akshay Gupte, Doctoral Candidate, Industrial and Systems Engineering, Georgia Tech. He delivered a lecture on "Lifted Inequalities for Bilinear Flow Constrained Sets"

Dr. Ankur Kulkarni, Post Doctoral Fellow, Coordinated Science Laboratory, Univ. of Illinois-Urbana Champagne. He delivered a lecture on "An Optimizer's Approach to Stochastic Control Problems with Non-classical Information Structure" (via Skype).

Dr. Veeraruna Kavitha, Post Doctoral Fellow, INRIA, France. She delivered a lecture on "Stationary Performance of Continuous Polling Models and Risk Sensitive Control of Delay Tolerant Networks".

Dr. Ashutosh Mahajan, Argonne National Lab. He delivered a lecture on "Mixed Integer Nonlinear Optimization: Algorithms and Software".

Dr. Badri Narayan, GM (R&D), Center for Railway Information Systems. He delivered a lecture on "CRIS: The IT Engine of Indian Railways".

Dr. Yogeshwaran Dhandapani INRIA, France. He delivered two lectures on "Percolation Theory".

Dr. David Abramson, Monash University, Australia. He delivered a lecture on "High Throughput Computational Science with the Nimrod Toolkit".

Dr. Vadlamani Sreekar, TIFR Center for Applicable Mathematics. He spent one month (July 2011) at the department and delivered a lecture series on "Stochastic Analysis: Malliavin Calculus".

Dr. M. Ravibabu, General Manager RITES. He delivered a lecture on "Assessing the Freight Transport System in India: Overview of Current State and Methodological Challenges".

Dr. Aatira Nedungadi, IISc. He delivered a talk on "Granger Causality for Point Processes".

Dr. G. Raghuram, IIM Ahmedabad. He delivered a talk on "Managerial Issues based on O.R. Analysis of Public Systems".

Mr. Krishnamurthy Iyer, Doctoral Candidate, Stanford University. He delivered a talk on "Mean Field Equilibria of Dynamic Auctions with Learning".

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

Rangaraj, N.
Work on "O.R. Applications in Railway Operations" at the *Workshop for O.R. Teachers*, held on March 15 2012 at ORSI Ahmedabad Chapter and Durgadevi Saraf Institute of Management Studies, Malad, Mumbai.

Mallikarjuna Rao, K.S.
School of Mathematical Finance, held on January 16-27, 2012 at ICTS, TIFR, Mumbai.

Mathematics Education-Trends and Challenges, held on August 19-21, 2011 at University of Hyderabad.

JTG Summer School, held on May 7-14, 2011 at IIT Bombay.

Work on "Optimal Control with average payoff and viscosity solutions" at *Workshop on Variational Analysis and Optimization with applications to PDEs*, held on April 1-4, 2011, at IIT Gandhinagar

$Singh, V.V.
Workshop on Game Theory, held on January 3- 4 2012 at ISI Chennai.

Mallikarjuna Rao, K.S. and $Ghatak, A.
Lectures on Probability and Stochastic Processes VI, held on December 16-20, 2011 at ISI, Kolkata.

$Ghatak, A.
Poster on "Evolutionary Stability against Multiple Mutations" (joint work with Mallikarjuna Rao, K.S and Shaiju, A.J.), at the *Lectures on Probability and Stochastic Processes VI* held on December 16-20, 2011 at ISI Kolkata.

$Kulkarni, K.
"Stochastic Job Shop Scheduling using Hybrid Simulation and Optimization Approaches" (a joint work with Venkateswaran, J.) at the *International Simulation Conference of India*, held on February 2-4 2012, at IIT Bombay.

$Agrawal, P.
"Simulation of multiple line rail sections" (joint work with $Shelar, D., Rangaraj, N. and Ranade, A.), at the *International Simulation Conference of India*, held on February 2-4 2012 at IIT Bombay.

Darapaneni, N.
"A Multi-level Monte-Carlo Approach to the Simulation of Multidimensional SDEs" (joint work with Mallikarjuna Rao, K.S. and Venkateswaran, J.), at the *International Simulation Conference of India*, held on February 2-4 2012 at IIT Bombay.

Hemachandra, N., $Singh, V.V., $Ghatak, A.
International Conference on Game Theory and Operations Research Applications held on January 5-7 2012, at ISI Chennai.

$Ghatak, A.
"Bribery, A Game Theoretic Approach", at the *International Conference on Game Theory and Operations Research Applications* held on January 5-7 2012, at ISI Chennai.

$Singh V.V.
"A Computational Study of a Stochastic Game Based Pollution Tax Model" (a joint work with Hemachandra, N. and Mallikarjuna Rao, K.S.) at the *International Conference on Game Theory and Operations Research Applications* held on January 5-7 2012, at ISI Chennai.

Hemachandra, N.
"An Excess Based Solution Concept for Cooperative Games with Transferable Utility" (a joint work with Vanam K.C.) at the *International Conference on Game Theory and Operations Research Applications* held on January 5-7 2012, at ISI Chennai.

"Performance Analysis of a delay dependent priority queue arising from a joint pricing and queue management model" (joint work with Raghav, B.S.) at the *International Conference on Advances in Modeling, Optimization and Computing,* held during December 5-7, 2011 at IIT Roorkee.

Shaiju, A.J.
"Evolutionary Stability in 2 × 2 Symmetric Games" (joint work with Mallikarjuna Rao, K.S) at the *International Conference on Game Theory and Operations Research Applications* held on January 5-7 2012, at ISI Chennai.

Venkateswaran, J.
"Impact of Control Parameters on Bullwhip Measure of Production-Inventory Systems" (co-authored with Bijulal D., COE, Trivandrum and Hemachandra N., IIT Bombay) at the *International Conference on Advances in Supply Chain and Manufacturing Management*, held during December 16-18 2011, at IIT Kharagpur, India.

"Collaborative Services Provision in Production-Logistics Scheduling: A Coal Industry Example" (co-authored with Thomas, A, Krishnamoorthy, M., IITB-Monash Research Academy, and Singh, G., CSIRO, Australia) at the *2nd International Conference on Services in Emerging Markets* held during September 29th – October 1st 2011, at IIT Bombay.

"Simulation based Analysis of Service Levels in Stable Production-Inventory Systems" (co-authored with Margabandu, K., Bijulal D. and Hemachandra, N.) at the *29th International Conference of the System Dynamics Society* held during July 24-29 2011, at Washington, DC, USA.

Poster on "Production Planning using Hybrid Optimization-Simulation based Approach" (joint with Sharma, V) at the *2011 INFORMS Simulation Society Research Workshop*, held during July 18-20, 2011 at The University of Montreal, Montreal, Canada.

$Singh, T.R.
"Calculation of Constructible Set of Configurations for product variety management" (co-Authored with Rangaraj, N, Schuette, A. and Schlange, C., Daimler AG, Germany) at the *OR 2011 Conference* held during August 30 - September 2, 2011 at Zurich.

$Singh, V.V.
"Constrained stochastic game with independent state processes: A mathematical programming approach" (co-authored with Hemachandra N.) at the *8th International ISDG Workshop* held during July 21-23 2011 at Padova, Italy.

Venkateswaran, J. and $Kulkarni, K.
2011 INFORMS Simulation Society Research Workshop, held during July 18-20, 2011 at The University of Montreal, Montreal, Canada.

$Kulkarni, K.
Poster on "Scheduling in stochastic job shops using Hybrid Simulation and Optimization Approaches" (joint with Venkateswaran, J) at the *2011 INFORMS Simulation Society Research Workshop*, held during July 18-20, 2011 at The University of Montreal, Montreal, Canada.

$Vanam, K.C.
"A New Excess-based Solution Concept for Cooperative TU Games," (co-authored with

Hemachandra N.), at the *19th Triennial Conference of the International Federation of Operational Research Societies (IFORS2011)*, held during July 10-15, 2011 at Melbourne, Australia.

Sen, G.
"Static Data Segment Location Problem in Information Networks" (co-authored with Krishnamoorthy, M (IITB Monash Research Academy), Abramson David (Monash University), Narayanan, V. and Rangaraj, N), at the *19th Triennial Conference of the International Federation of Operational Research Societies (IFORS2011)*, held during July 10-15, 2011 at Melbourne, Australia.

$Thomas, A.
"Collaborative Resource Constrained Scheduling : A Coal Industry Example," (co-authored with Singh, G. (CSIRO, Australia), Krishnamoorthy, M., (IITB Monash Research Academy) and Venkateswaran, J.) , at the *19th Triennial Conference of the International Federation of Operational Research Societies (IFORS2011)*, held during July 10-15, 2011 at Melbourne, Australia.

Narayanan, V.
Work on "Semidefinite Representation of Integer Hulls" at the *Mixed-Integer Programming Workshop* held on June 20-23, 2011, at the University of Waterloo, ON, Canada.

Conferences/Symposia/Workshops/ Seminars (Coordinated/ Chaired by Faculty)

Venkateswaran, J. and Hemachandra, N.
Coordinated and chaired the *1st International Simulation Conference of India*, held on February 2-4, 2012 at IIT Bombay.

Narayanan, V. and Mallikarjuna Rao, K.S.
Coordinated the *Symposium on Optimization and Control*, held on February 21-22, 2012 at IIT Bombay

Hemachandra, N.
Programme Committee member and session chair at the *International Conference on Game Theory and Operations Research Applications* held on January 5-7 2012, at ISI Chennai, 2012

Chaired a session at the *International Conference on Advances in Modeling, Optimization and Computing,* held during December 5-7, 2011 at IIT Roorkee.

$Vanam, K.C.
Chaired a session on "Innovative Applications in Game Theory," at the *19th Triennial Conference of the International Federation of Operational Research Societies (IFORS2011)*, held during July 10-15, 2011 at Melbourne, Australia.

Invited Lectures

Hemachandra, N.
"Quadratic programs and some constrained stochastic games," School of Technology and Computer Science, TIFR, Mumbai, May 12, 2011.

Honorary Work

IEOR faculty have been reviewers for European Journal of Operational Research, Opsearch, Management Science, Discrete Optimization, Indian Journal of Pure and Applied Mathematics, Transportation Science, IEEE Transactions of Automation Science and Engineering.

Faculty Members and their Specializations

1. Vishnu Narayanan
Integer Programming, Convex Optimization, and Polyhedral Theory

2. K.S. Mallikarjuna Rao
Game theory, Mathematical Finance, Partial Differential Equations

3. Jayendran Venkateswaran
Modeling & Distributed Simulation (Discrete-event, System Dynamics), Integrated Supply Chain Analysis

4. N. Hemachandra
Methodologies like Markov decision models, Queueing models, Game theory, etc. Applications of such methodologies to 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
P.G. Awate (ME)
A. Subash Babu (ME)
P. Chaporkar (EE)

Associated Faculty: Research
G. K. Adil (SJMSOM)
R. Banerjee (ESE)
V. Borkar (EE)
A. A. Diwan (CSE)
K. Moudgalya (Chem Engg)
A. Ranade (CSE)
S.A. Sabnis (MA)
S. A. Soman (EE)
A. Subramanyam (MA)
K. Suresh Kumar (MA)
V. M. Tom (Civil Engg.)

Systems & Control Engineering

Introduction

The Systems and Control group formed in 1977 is a unique interdisciplinary programme in the country that offers postgraduate education (M.Tech./Ph.D.) in the broad area of Systems and Control. The group has seven core faculty members and 11 associated faculty members from other academic units of the institute. The average doctoral strength is around 20 and the M.Tech. intake every year is around 21. The research focus of the core group is in the areas of nonlinear control, robotics, path-planning, embedded control, coordination of autonomous vehicles, multi-agent systems, sliding mode control and applications, fractional-order modelling and control, optimization and optimization-based control, and stochastic processes. In addition, research in the areas of process control, identification, behavioural theory, matrix computation, automotive control are being pursued by the associated faculty members. Many of the alumni of the group hold senior positions in the control and automation industry and research laboratories in the country.

Academic Programme

The group offers M.Tech. and Ph.D. programmes. During the academic year 2011-2012 the number of students joined the M.Tech. programme was 19 and the Ph.D. programme was 8. This year 20 M.Tech. degrees and 1 Ph.D. degree were awarded.

Student Intake	
M.Tech.	: 19
Ph. D.	: 8
Degrees Awarded	
M.Tech.	: 20
Ph. D.	: 1

R & D Activities

Sponsored Research Projects:	
New	: 7
Ongoing	: 4

Project Title	Sponsoring Agency	Status
"Multivariable Control Scheme for Gas Turbines using the Model Predictive Control Strategy"	GATET (under GTRE, Defence Research & Development Organization)	New
"Constraint-Based Design of Controllers and Prefilters"	Indo-French Centre for the Promotion of Advanced Research (DST)	New
"Design of Manually Readable & Automatic Readable Domestic Water Meters Suitable for Rural Areas"	Ministry of Drinking Water and Sanitation	New
"Control Engineering Laboratory"	Ministry of Human Resource Development	Ongoing
"Simulation of Control of MagneticLevitation System"	Ministry of Human Resource Development	Ongoing

Project Title	Sponsoring Agency	Status
"Decentralized Control of Multi-satellite Formation Flying"	ISRO	New
"Analysis and implementation of cooperative control behavior of a distributed multi-vehicle system"	IRCC	Ongoing
"Highly Complex and Networked Control Systems"	HYCON2	Ongoing
"Differential geometric techniques appliedto problems in engineering"	National Board of Higher Mathematics	New
"Controllability issues in satellites"	Indian Space Research Organization	New
"Design of Missile Auto Pilot using Higher Order Sliding Mode Control"	RCI, Hyderabad	New

Extension Activities

The development of a laboratory on embedded control systems is underway. The experiments in this laboratory intend to provide hands-on experience to students on design and implementation of control systems on different embedded platforms. They are designed to cover the dependencies between control system and implementation, design trade-offs and issues related to computer-based control. The laboratory also focuses on the research issues of implementing different advanced control strategies by selecting the right embedded platform.

Visitors to the Department

Prof. Martins Bruveris from the Department of Mathematics, Imperial College, visited the group from Feb. 20th to March 2nd, 2012 and delivered a series of lectures on "Computational Anatomy".

Eric Feron, Professor, Georgia Tech, visited the group on 6th Jan. and gave a talk on "Proof-Carrying auto coded control software."

Maria Domenica Di Benedetto, Professor, University of L'Aquila, visited the group on 24th Feb, and gave a talk on "Observability and Diagnosability for Hybrid Systems."

Prof. Leonid Fridman & Prof. J. A. Moreno from University National Autonomous, Mexico under Indo–Mexican project during the period 5th-15th Jan 2012.

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

S. Srikant, M. R. Akella
"Persistence Filters for State Observation and Feedback Control in Shared-Sensing Based Reversible Transducer Systems", *International Conference on Computational & Experimental Engineering and Sciences (ICCES'11),* April 18-21, 2011.

Conferences / Symposia / Workshops / Seminars(Coordinated/Chaired by Faculty)

Nataraj P. S. V. organized a *CEP course on Magnetic Resonance Imaging*, an open programme at IIT Bombay, June 20-24, 2011.

Banavar Ravi, Sinha Arpita, Chatterjee Debasish organized the *second winter school on Control and dynamical systems*, which was held from Jan. 16th to 20th, 2012 and was attended by nearly 60 participants - graduate students and college teachers - from all over the country.

Bandyopadhyay B. organized the *12th International Workshop on Variable Structure Systems*, at IIT Bombay in January 2012.

Awards/Distinctions

S. Srikant got the "Young Faculty Award" awarded by IIT Bombay to all newly joining faculty under awards/distinctions.

Invited Lectures

Sinha Arpita delivered a few lectures on design concepts on control systems for guided weapons and Vehicles at NSTL, Vishakhapatnam July 2011.

Chatterjee Debasish delivered a talk in "Industrial Engineering and Operations Research" as part of a *2-day Workshop on Optimization & Control*, IIT-Bombay, Feb, 21- 22, 2012.

Banavar Ravi delivered a talk on "Characterizing Reachable Sets in a Spacecraft with Two Rotors: The Lagrange-Routh Approach." at the I*nternational Conference on Advances in Control, Optimization and Dynamical Systems*, held at IISc from Feb. 16th to 18th, 2012.

Faculty Members and their Specialization

Core Faculty:

1. Banavar R. N.
Convener, Systems and Control Engg.
Optimal control, Geometric mechanics and nonlinear contol, 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. achhani Leena
Reconfigurable hardware, Embedded control systems, Robotic path planning algorithms, Hardware software co-design.

6. Chatterjee Debasish
Constrained and optimization based control, in particular, stochastic model-predictive/receding-horizon control; switched and hybrid systems; control under communication and computation constraints; stochastic control; applications of stochastic process in engineering systems

7. Sukumar Srikant
Nonlinear and adaptive control, non-autonomous controller and state observer design, decentralized control, cooperative and network control, hybrid systems, mathematical control theory. Application areas: Spacecraft attitude control, bio-mechanical systems, dynamics and control, power systems, autonomous vehicles and robotics, formation flying and consensus theory.

Associated Faculty

8. Hemendra Arya
Department of Aerospace Engineering
Composite structures
Systems Design & Engineering
Mechatronics

9. Moudgalya Kannan
Dept. of Chemical Engg.
Process Control, Simulation, Software Engg

10. 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

11. Bhartiya Sharad
Dept. of Chemical Engg.
Modeling, Identification and control of hybrid systems Analysis of biological regulatory networks

12. 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.

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. Borkar Vivek S
Dept. of Electrical Engg.
Stochastic Control,
Learning Control Theory,
Random Processes.

17. 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.

18. 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.

Educational Technology

Introduction

The Interdisciplinary Programme in Educational Technology (ET) completed its second academic year in 2011-12. New batches of Ph.D. students have joined, and the total number of Ph.D. students now stands at 13. As in the last year, 23 faculty members from several departments of the institute are participating in the academic programme. The faculty members are participating in several projects, including the MHRD projects. The major research areas pursued by the faculty include (a) design and deployment of virtual laboratories and remote triggered experiments, (b) open source software, open source hardware, (c) synchronous and asynchronous education, (d) instructional design in different streams of science and engineering, (e) learner centric tutoring systems, (f) implementation and assessment of ICT tools to enhance learning in new environments designing collaborative environments for learning and social interactions, (g) mining for textbook generation, and (h) exploring the role of simulations, models and animations in teaching large classes.

Academic Programme

The two courses that are being offered to the students are (1) Introduction to Education Technology and (2) Research Methods in Educational Technology. A few guest lectures were given by Dr. Kinshuk and Dr. Chang, with some of these lectures using videoconferencing. The research scholars contributed to several research papers in different national and international conferences. There were 10 invited talks in the IDP on different issues related to educational technology.

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

K. Vijaya Kumar and Sridhar Iyer
"Automated Tagging to Enable Fine-grained Browsing of Lecture Videos" *Technology for Education Conference (T4E 2011)*, Chennai, India, July 14-16, 2011.

Neelamadhav G and Sridhar Iyer
"Automated Building of Domain Ontologies from Lecture Notes in Courseware," *Technology for Education Conference (T4E 2011)*, Chennai, India, July 14-16, 2011.

S.K.Kamble and B. L. Tembe
"The use of Concept Maps in the Teaching of the Second Law of Thermodynamics to Engineering Students", *1st International Conference and 5th CSI National Conference on Education & Research (confER-2012), (Applications of Foss in Education & Research),* 12th-13th January, 2012, Lingaya's University, Faridabad, India.

Inderpreet Arora, Kannan M. Moudgalya, Kaushik Venkata, Chakraborty Victor, Rupak Rokade, Rakhi R.
"A Low Cost, Scalable, Virtual Laboratory", *the 9th IEEE International Conference on Control & Automation, ICCA11*, Santiago, Chile, December 19-21, 2011.

A. Petiwala and Kannan Moudgalya
"Constructing a Learner Centric Semantic Open Syllabus for Automated Text Book Generation, Technology Enhanced Education (ICTEE)", 2012 *IEEE International Conference on, Digital Object Identifier*: 10.1109/ICTEE.2012.6208624 , 2012

Kannan Moudgalya
"Spoken Tutorial: A Collaborative and Scalable Education Tehnology", *CSI Communications*, September 2011, p-11-12

Gargi Banerjee and Sahana Murthy
"Model for Rapid, Large-Scale Development of Learning Objects in Multiple Domains", *3rd IEEE International Conference on Technology for Education (T4E 2011)*, July 14-16, 2011, Chennai, India.

Conferences/Symposia/Workshops/ Seminars (Coordinated/ Chaired by Faculty)

Sahana Murthy
Technical Co-Chair, for the 3rd International Conference on Technology for Education (T4E 2011, July 14-16, 2011)

Honorary Work

Kannan Moudgalya
Served as Member, Standing Committee, National Mission on Education through ICT,
Served as Member, Academic Council, IGNOU

Faculty Members and their Specialisations

1) **P. J. Bhat**
Educational Technology in Biosciences

2) **M. C. Deo**
Instructional Design for Civil Engineering

3) **T. I. Eldho**
Role of Geospatial Technologies in Enhancing Technical Learning, New Instructional Design Paradigms for fluid mechanics learning.

4) **V. M. Gadre**
Video Coding for the purpose of Distance Education - technology of coding and transmission.

5) **U. N. Gaitonde**
Instructional design in Mechanical Engineering and Thermodynamics

6) **Meenakshi Gupta**
Educational Psychology

7) **Sridhar Iyer**
Learner-centric tutoring systems.
Pedagogy for online learning.
Concept inventory development.

8) **Shishir K. Jha**
Use of technology in classroom pedagogy.
Specific use of WEB 2.0 technologies.
Transformative pedagogical engagement for the student and the teacher.

9) **Anirudha Joshi**
Visual Design, Usability Studies, Human Computer Interface Design, Contextual Design, Interface Evaluation, Interface Design for Indian languages, New Media Design

10) **A. V. Mahajan**
Technology Enhanced learning, Physics Education

11) **Kannan Moudgalya**
IT literacy, bridging digital divide, virtual labs, open source software, open source hardware, synchronous and asynchronous education, educational methodologies, mining for textbook generation.

12) **Sahana Murthy**
Pedagogy and evaluation of e-learning content Implementation and assessment of ICT tools to enhance learning in new or constrained situations Use of technological tools in physics education

13) **K. Narayanan**
Economics of education,
Economic impacts of technology-enabled education Socioeconomic empowerment through technology education

14) **Santosh Noronha**
Design and deployment of remote triggered experiments, and employing multivariate statistical/pattern recognition methods for use in evaluating research methodologies

15) **Prita Pant**
Technology-Enhanced learning in metallurgical engineering and materials science – explore the role of models and animations in teaching large classes (up to 100 students)

16) **M. B. Patil**
Design and deployment of virtual laboratories and remote triggered experiments

17) **D. B. Phatak**
Educational Technology for Countrywide Education particularly in Computer Science and Engineering

18) **Ravi Poovaiah**
Designing collaborative environments for learning and social interactions, Designing for children - with a focus on 'play and learn', Information design, Structuring and visualisation, Interface design and Designing interactions, Temporal and spatial aspects of visual language

19) **C. S. Solanki**
Educational technology for photovoltaics

20) **K. Sudhakar**
Educational methodology

21) **B. L. Tembe**
"New instructional design paradigms for thermodynamics and statistical mechanics"
Application of methods of educational technology in chemical education

22) **S. Umashankar**
Technology - enhanced learning, Physics education

23) **J. K. Verma**
Technologies for mathematics education for large classes

publications

Books/Monographs

Arceivala, S. J., Asolekar, S. R.
Wastewater Treatment for Pollution Control (3rd Edition, Fifth and Sixth Reprints). McGraw Hill Educational Publications (India) Ltd., New Delhi.

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(Eds.)*Proceedings of International Conference on Nanoscience and technology (ICONSAT 2010)* as a Special Issue of *International Journal of Nanoscience*, 2011, World Scientific, Singapore.

Bakahum, R. & Eldho, T.I.
(Eds.) R. Balaji & T.I. Eldho, *Coastal Processes and Modelling* – Editors:, Lecture notes for CEP/QIP course, March 2011, IIT Bombay.

Banerjee, R.
Nanotechnology Perspectives in the Diagnosis and Treatment of Cancers, Society of Cancer Research and Communications, Narosa International, New Delhi. 2012

Bhaskar Roy
Aircraft Propulsion – Science of Making Thrust to Fly – 2011 – Elsevier (India) Publications

Dhamdhere D.M.
Systems Programming, Tata McGraw Hill, May 2011.
Operating Systems – A Concept-Based Approach, third edition, Tata McGraw Hill, February 2012.
Operating Systems – A Concept-Based Approach, Korean Translation, March 2012.

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*Finite Element Method & Applications in Civil Engineering (*Eds.) T.I. Eldho, & Y.M. Desai, Lecture notes for CEP/QIP course, August 2011, IIT Bombay.

Eldho, T.I.
Rainwater Harvesting & Sustainable Water Management . (Ed.) T.I. Eldho, Monograph for CEP/QIP Course, November 2011 & March 2012, IIT Bombay.

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IP for Development: The Emerging Paradigm. Utkarsh Prakashan, 2012

Kelkar Shashikant
IT Service Management - published by Prentice Hall of India 2012

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Prospective Memory: Realization of Delayed Intention, University Book House Publication, Jaipur, India

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Hyperspectral Image Pre-Processing in Hyperspectral Data Analysis Techniques and Applications (Eds.) R. R. Navalgund and S. S. Ray, Indian Society of Remote Sensing, Dehradun, 2011.

Kulkarni, N. H., and **Rastogi, A. K.**
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Ramasubramanian, K.
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ANN, SA and GA Application in Groundwater Hydrology, LAP LAMBERT Academic Publishing, Saarbrücken Germany, (2011)., ISBN 978-3-8454-7170-9.

Ravi, B.
Metal Casting: Computer-aided Design and Analysis, New Delhi: PHI, 2005-2011.

Sharma, V.D.
Some Selected Topics in Fluid Mechanics: National Status Report, Indian National Science Academy (INSA), New Delhi, 2012.

Solanki, Chetan Singh
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Next Generation Business Intelligence: a knowledge-based approach, Vikas Publishing House, New Delhi, 2011.

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Co-Author for new textbooks on *Graphic Design*, published by National Council of Education Research and Training, Government of India, New Delhi.

Chapters in Books

Asolekar, S.R., Kalbar, P. P., Tilwankar, A.K.
"Framework for Sustainable Urban Environmental Services: Successful Application to High Rise Buildings in Mumbai" in *Designing Sustainable Products, Services and Manufacturing Systems* (Eds.) Chakrabarti, A., Rachuri, S., Sarkar, P. and Kota, S.; published by Research Publishing Services, Singapore, 2011.

Bandyopadhyay S.
"Solar Energy Storage: Technologies and Sizing" in *A Solar Future for India* (ISBN: 81-902925-2-8) (Ed.) G. M. Pillai, World Institute of Sustainable Energy, Pune, India, 81-99, 2011.

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"Solar Energy Applications in India" in *Energy and Power Generation Handbook: Established and Emerging Technologies*, (Ed.) K. R. Rao. New York: ASME Press, ISBN: 9780791859551, 2011.

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"Reasoning about Heap Manipulating Programs using Automata Techniques" in *Modern Applications of Automata Theory*, (Eds.) Deepak D'Souza and Priti Shankar, World Scientific, Oct 2011

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"Institutional Changes, Public Provision and Drinking Water Supply in Kerala" in *Water Governance in South Asia: Paradigm Shifts and Civil Society Responses,* NC Narayanan, S. Parasuraman and Rajindra Aryabandhu (Eds.), Routledge, New Delhi.

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Central library

Central Library as we know today is an outstanding contribution of IIT Bombay's Culture of Excellence to the world of scholarship. Housed in an independent five-storied building, it holds one of the best collections of knowledge resources both in print and electronic form in engineering, sciences, technology, arts and humanities, and social sciences. The Library is valued by its users (over 10,000) not just for the facilities it provides – or for the strength of deep, relevant collections, it has – but for the ways in which it understands their needs and supports their forward-looking academic and research mission through Users – focused services. The library has galvanised itself to successfully engage its users in a multifaceted information environment in order to remain their valuable partner in education and research.

2. Collection Development and Management

Collection building is a core activity of the library enabling selection, acquisition, processing and disseminating of latest and useful resources to support academic and research work of the students, faculty, staff and other users. The library collection comprising of books, journals, theses, reports, standards, pamphlets and other reading material as on March 2012 stands as follows :

Collection	*Added during 2011-12*	*Total as on 31 March 2012*
Books, theses, CDs, Videos	3718	232815
TLL & BC (Book bank) collection	481	11871
Bound volumes of journals	2696	117580
Reports, pamphlets, standards	204	67512
Photocopies, films	—	4410
Total	7099	434188
Subscription to journals	—	1290

During the year, the library undertook a massive reorganization of its collection and over 50000 volumes of old and less used books and bound journals were shifted to newly installed movable stacks for compact storage in the basement. A system has been put in place for quick recall of such documents including an annotation in the library catalogue (OPAC) for all books. This exercise has helped the library to create space for new additions. Special care was taken to neatly maintain the library stacks to facilitate users to locate the desired document. A book exhibition was organized during January 2012 to facilitate students, faculty and staff to browse and select latest publications in their subjects. The library also organized an exhibition-cum-display of Hindi books during the HINDI PAKHWADA celebrated by the institute.

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 library has created a blog to post current and interesting information regarding our resources, services and news items from IITB and other institutes **(http://iitblibrary.wordpress.com/)**. It also offers a platform to interact with our users for their comments and feedback.

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 renewal and 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 :

3.2.1 Full-text Resources

Full Text E-resources

ABI Inform -	http://proquest.umi.com/pqweb?RQT=302&cf=1
ACM Digital Library -	http://portal.acm.org/portal.cfm
ACS Journals -	pubs.acs.org/journals
ACS Legacy Archives (23 journals 1879-1995)	http://pubs.acs.org/archives/promo/index.html
AIAA Journals -	http://www.library.iitb.ac.in/dres/AIAA.html
AIP Journals -	http://www.library.iitb.ac.in/dres/AIP.html
American Economic Association	http://http://www.aeaweb.org
American Geophysical Union	http://www.library.iitb.ac.in index.php?option=com_content&task=view&id=157&Itemid=1
AMS Journals -	http://www.ams.org/journals/
Annual Reviews	http://www.annualreviews.org/
ASBMB (JBC/MCP)	http://http://www.asbmb.org/
ASCE Journals -	http://www.pubs.asce.org/journals/jrns.html
ASCE Proceedings -	http://www.ascelibrary.org/ascecp
ASME Journals (+ AMR) -	http://www.asme.org/publications/journals
ASTM Journals -	http://journalsip.astm.org
ASTM Standards -	http://enterprise.astm.org
BioOne 1 (82 high impact bioscience journals and 1 book)	htp://www.bioone.org
Blackwell/Wiley Journals -	http://www.library.iitb.ac.in index.php?option=com_content&task=view&id=140&Itemid=1
Cambridge University Press Journals	http://journals.cambridge.org
Capitaline -	http://www.capitaline.com/user/framepage.asp?id=1
CMIE Databases	On Intranet
CRIS-INFAC CRISIL Ind. Information -	http://www.crisil.com
Duke Mathematical Journal (Volume 1 100)	http://www.projecteuclid.org
EBSCO Databases -	http://search.ebscohost.com/
EdITLib: Education and Information Technology Digital Library	http://http://www.editlib.org/
Emerald Full text -	http://www.emeraldinsight.com/

Euromonitor GMID -	http://www.euromonitor.com/gmid
GSA Journals	http://www.library.iitb.ac.in/ index.php?option=com_content&task=view&id=174&Itemid=1
Geological Society Journals	http://www.library.iitb.ac.in/ index.php?option=com_content&task=view&id=178&Itemid=1
ICE (24 journals)	http://www.icevirtuallibrary.com/content/journals
IEEE/IEE Electronic Library Online -	http://ieeexplore.ieee.org
ICSD Inorg Crystal Str DB	http://icsd.fiz-karlsruhe.de/icsd/StartActionPath.do
IEC Standards	http://bis.library.iitb.ac.in/iec/
INFORMS (12 journals package)	http://journals.informs.org
INSIGHT -	http://www.insight.asiancerc.com/
JSTOR Journals Archive -	http://www.jstor.org
IOP Electronic Journals -	http://www.iop.org/EJ/subs/-view=journal
Journal of Geophysical Research (7 journals)	
Space Physics	http://www.agu.org/journals/ja
Solid Earth	http://www.agu.org/journals/jb
Oeans	http://www.agu.org/journals/jc
Atmospheres	http://www.agu.org/journals/jd
Planets	http://www.agu.org/journals/je
Earth Surface	http://www.agu.org/journals/jf
Biogeosciences	http://www.agu.org/journals/jg
IOM - Maney Journals	http://www.library.iitb.ac.in/ index.php?option=com_content&task=view&id=139&Itemid=1
JoVE : Journal of Visualized Experiments	http://www.jove.com/
Material Science and Engineering Collection (Trans Tech) -	http://www.scientific.net
Multi Science Journals	http://multi-science.metapress.com/home/main.mpx
NGP Journals (Nature 27 Journals)	http://www.nature.com/nature/index.html
Nature Online (27 journlas) -	
Optics Infobase, Optical Society of America (14 journals)	http://www.opticsinfobase.org
Oxford Subject Collections	http://www.oxfordjournals.org/
Humanities & Social Sciences	
Mathematics & Physical Sciences	
Proceedings of the Royal Society (A)	http://rspa.royalsocietypublishing.org
Project MUSE -	http://muse.jhu.edu
Psycarticles -	http://csaweb106v.csa.com/ids70/ quick_search.php?SID=2qh6a3sa5h775hqbsid1a0eip6
PV-Tech	http://www.pv-tech.org
RSC Journals + Archives -	http://www.rsc.org/publishing/journals
Sage Subject Collections (with 3 subjects)	http://online.sagepub.com/
Science Direct -	http://www.sciencedirect.com/
Science of Synthesis	http://www.science-of-synthesis.com/prod/user/index.html
Science Online (AAAS, USA) -	http://www.sciencemag.org
SIAM Journals Online -	http://epubs.siam.org/
SIAMs Archive (LOCUS) -	http://locus.siam.org/
Springer verlag Link (Lecture Notes Series)	http://www.springlink.com/
TRB Publications	http://www.trb.org/Main/Home.aspx
Taylor & Francis Journals -	http://http://www.tandfonline.com/

Wiley Journals -	http://www.library.iitb.ac.in/ index.php?option=com_content&task=view&id=140&Itemid=1
World Scientific Journals	http://www.library.iitb.ac.in/ index.php?option=com_content&task=view&id=144&Itemid=1

Addition of New E-resources

CRISIL RESEARCH (Registration is required)	http://www.library.iitb.ac.in/ index.php?option=com_content&task=view&id=183&Itemid=1
Molecular & Cellular Proteomics	http://www.asbmb.org/Page.aspx?id=644
RSC Package A+ is upgraded to RSC Gold consisting of all RSC Titles	http://www.rsc.org

3.2.2 Databases

Indian Standards	-	http://bis.library.iitb.ac.in
Indian Patents	-	On library intranet
Inorganic Crystal Structure Database	-	http://icsdweb.fiz-karlsruhe.de/index.php
INSPEC	-	http://www.engineeringvillage2.org
J-Gate	-	http://j-gate.informindia.co.in
JCCC	-	http://jccc-indest.informindia.co.in/
MathSciNet	-	http://www.ams.org/mathscinet
Scifinder Scholar	-	http://web.scifinder/scholar/index.html
SCOPUS	-	http://www.scopus.com
Web of Science and Journals Citation Report	-	http://isiknowledge.com/

3.2.3 Multimedia (intranet, CD-net)

Chemical Abstracts – 12th & 13th Collective Index
Chemical Abstracts on CD (2003-)
Indian Patents
Indian Standards
Power Diffraction Files

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, 889 M. Tech. dissertations and 157 Ph. D. theses were submitted on line.

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 has over 13500 items and is being updated to cover more publications which are permissible within the copyright regulations. The archive accessible through the library homepage, is the single largest source of IITB publications.

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 handled 226531 loan transactions of books and other documents to its members during the year. In addition to members, 565 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). Library remains open till 0100 hrs on all days during examinations. Ask the Librarian link provided from the library home page encourages users to avail the reference service virtually.

4.2 Sharing of Resource and Photocopying service

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 15 and borrowed 2 books to / from other libraries. It provided 987 pages of photocopies to individuals and organizations on payment or on exchange. The library also received 125 pages of photocopies from other institution. 47 organizations maintain Deposit Account with the library to obtain photocopies quickly. The library also supplied 3324 pages of photocopies to the institute faculty free of charge, and 65,326 pages to other users / visitors on payment.

4.3 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, 897 students availed this facility and borrowed 5523 books from this collection.

4.4 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

User education is an important regular activity of the library to inform, alert, educate and train users about various resources and services of the library. 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. Mr. D. Jotwani, Institute Librarian was invited to participate in the ACM Digital Library Advisory Board Meeting, Harrogate, UK, 3 April 2011. He also attended the UK Serials Group Annual Conference in Harrogate, UK 4-6 April 2011.

7. Building

In order for the library to remain relevant and to attract large number of users, it has been planned to renovate the existing building, reorganize the resources and work flows and to create a variety of spaces and ambiance which our users will find extremely attractive and conducive for their work. The renovated library building will reflect current trends in ICT and the changing needs of library staff, students and faculty in their use of the library resources and services. A proposal to renovate the library building including addition of a new floor has been approved by the competent authority and an Architect / Consultant has been appointed to prepare designs, estimates etc for this purpose.

Centre for Distance Engineering Education Programme

The Centre for Distance Engineering Education Programme (CDEEP) continued its main activity of recording new courses and transmitting them to the participating remote centres. IIT Bombay got its policy guidelines on distance education implemented during the year. The earlier courses recorded by CDEEP are being made available to individual users at nominal charges. Many students and faculty members across the country are making use of this facility. During two semesters in the past year, 21 regular courses covering 10 disciplines were recorded and transmitted. The technology upgradation is continually pursued in CDEEP. As a result, there is a significant leap in the quality of audio and video through technologies, namely, videoconferencing and web transmission. This was also possible because of the HD quality equipment that is used and a good network bandwidth (through NKN) that is available. Four studios of CDEEP are fully equipped and functional to do the transmission through videoconferencing and web in an interactive mode. CDEEP provided recorded courses to 64 persons at Rs.300 (copying charges) per course. It also made available 180 days of uninterrupted access through internet VOD to another 27 users at Rs.1000 per course. CDEEP recorded various events on campus including 49th Convocation, Foundation Day, institute colloquia and distinguished talks.

Head, CDEEP, attended an international convention on "Virtual Education: Issues, Challenges and Perspectives" in New Delhi on February 24 and 25, 2012. Leading educators from several countries attended the convention. One of the main themes in the convention was how to make distance education effective. A virtual panel discussion on "Frontiers in Chemistry" was arranged on December 19, 2011, jointly by CDEEP and the Department of Chemistry. Fifteen institutions, including IITs, IISc, NCBS and universities, participated in the discussion and over 200 people attended the event.

During the year, several films of academic and research relevance were recorded by CDEEP. Notable among them are films on "High Performance Computing Facility" at IIT Bombay, "Transportation Engineering" (for WCTR 2016), "Research Activities of Research Scholars", and "Radiation Effects due to the Use of Mobile Phones".

CDEEP's support to NPTEL-II, MHRD-I and MHRD-II projects continued through the year by providing studio facilities and professional expertise. Twenty-five video courses have been recorded for the NPTEL-II project. There are 13 research scholars working in the interdisciplinary programme in Educational Technology, and CDEEP continues to support the activities of this programme.

Computer Centre

Computer Centre continues to provide computational and network infrastructural facilities and services to the IIT Bombay user community. It is responsible for the intra-campus connectivity and also for the Internet connectivity of IIT Bombay to the outside world. During the year, the following activities have been undertaken:

- The installation of network switches in the newly constructed residential buildings has been completed. The Internet facility is now available to each resident on the campus.

- A few network kiosks have been newly built to host the networking equipment, which can be used as distribution points to the nearby residential buildings on the campus.

- The total Internet bandwidth for IIT Bombay campus users has been increased from 565 Mbps to 910 Mbps. Computer Centre is satisfied with the quality of service provided by the empanelled

Internet service providers.

High Performance Computing Clusters: The old computing cluster CORONA continues to function as before. Given the space constraint, the cluster continues to be housed in the premises of the Chemistry department. The cluster "Spacetime Supercomputing" facility consisting of 380 nodes with as many as 3040 processing cores, built using the most recent Intel quad core processors, is operational at the ground floor of the Computer Science and Engineering department building. The aggregate theoretical speed is expected to be around 20 Tera-Flops. A course on High Performance Computing is being run on the "Spacetime" HPCC facility. The total number of research groups using the "Spacetime" facility is now 40.

Appropriate measures have been taken to reduce the noise generated by the chiller plant (of HPCC Facility) to the permissible levels. The installation of a Diesel Generator set for the "Spacetime" HPCC facility has been completed. It is expected that the DG-set will provide a better and smoother operation of the HPCC facility in terms of reducing the possibility of hardware failures.

National Knowledge Network (NKN): IIT Bombay continues to be a member of the National Knowledge Network. This multi-gigabit network initiative, started by the National Informatics Centre (NIC), is being used by CDEEP to conduct distance education programmes. Two staff members from the Computer Centre represented IIT Bombay in the the National Level meet of the partners of the NKN initiative, organised by CDAC. This enabled IIT Bombay to improve and enhance the technologies for fruitful use of the infrastructure under NKN. Grid Computing Facility – GARUDA: This facility, supported by the Computer Centre, allows the users of the institute to access the available resources on the National Grid.

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 System 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 meant for scientific and technical computation such as ANSYS, MATLAB, MATHEMATICA, MAPLE, Dytran / NasTran / Partan, Tecplot, libraries from Numerical Algorithm Groups (NAG), etc., that are available through appropriate licence schemes, are procured, upgraded and administered by the Computer Centre as per the requirements of the student, faculty, scientists and staff. Around 32 new faculty joined the institute during the year. They have been provided with a desktop computer/Laptop, printer and additional computer hardware.

The Computer Centre encourages and has implemented the use of Open Source software systems for office automation in about 765 PCs deployed in the various administrative sections of the institute. The centre continues to play a secondary role by providing

technical support to run the IP-based Security Surveillance systems for the Security section. The computer network set up by the centre enables the Electric Maintenance division to monitor the power distribution systems, check the status and operation of various lifts functioning in the buildings and also the functioning of UPS Systems. The Telephone Exchange runs a few IP telephones (Voice over IP) using the computer network of the institute. IIT Hospital displays the schedules of the availability of doctors on the Web site of the hospital and this information is accessible over the IITB LAN.

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 15 years. The cable network, as it exists now, is rather ad hoc and has seen patched many times because of damages, mostly during construction and the repair of roads. 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 for 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. The networking of the upcoming institute classroom complex is being undertaken.

academic report

ACADEMIC REPORT

Admissions offered at IIT Bombay for the following Programmes in 2011-12 are as follows:

Ph.D. (Autumn+Spring)	-	450
M.Tech.	-	701
M.Mgmt.	-	123
M.Des.	-	59
M.Phil.	-	14
M.Sc.-Ph.D. (Dual Degree)	-	55
M.Sc.	-	198
Dual Degree	-	242
5 Yr. Int. M.Sc.	-	28
B.Tech.	-	607
Preparatory Course	-	7
Total		**2484**

At the 49th Annual Convocation held in two sessions on 5th and 7th August 2011, 1846 degrees were awarded: B.Tech. - 328, Dual Degree (B.Tech. & M.Tech.) - 226, M.Tech. - 771, M.Sc. 2 year - 158, 5-year Int. M.Sc. - 18, M.Des. - 57, M.Phil. - 12, M.Mgmt. - 97, M.S. (By Research) – 01, PGDIIT – 05, and Ph.D. - 173.

MEDALS

The President of India Medal was awarded to Shah Nisarg Kirtikumar and the Institute Gold Medal went to Manas Rachh Nitin. The Silver Medalists under Dual Degree Programme were: Rachh Manas Nitin, Aerospace Engg.; Shetty Manish, Chemical Engg.; Anand Barot, Civil Engg.; Rahul Srinivasan, Computer Science & Engg; Sunny Mahajan, Electrical Engg.; Akash Phadnis, Mechanical Engg; Viraj Devendra Shah, Metallurgical Engg. & Materials Science; and Donvalkar Prathamesh Surendra, Engineering Physics. The Silver Medalists under Bachelor of Technology Programme were: Patil Varun Nandan, Aerospace Engg.; Shah Bhavik Prakash, Chemical Engg.; Deepak Jaiswal, Civil Engg; Shah Nisarg Kirtikumar, Computer Science & Engg.; Subhasis Das, Electrical Engg.; Carvelho Ashwin Mark Stephen, Mechanical Engg.; Joglekar Sameer Jayant, Metallurgical Engg. & Materials Science; Pranjal Bordia, Engineering Physics. The Silver Medalists under Master of Science Programme were: Chemistry – Tuseeta Banerjee (2-yr. M.Sc), Archana Raja (5-yr. Int. M.Sc.); Earth Sciences – Souvik Sen (Applied Geology), Prakash Ranjan (Applied Geophysics); School of Bioscience & Bioengg – Aishwarya Narayan (Biotechnology); Mathematics – Shraddha Srivastava (Mathematics), Abhijatri Das (Applied & Stat.& Informatics); and Physics – S.K. Jahiruddin.

STATEMENT SHOWING THE TYPES OF SCHOLARSHIPS, STIPEND AND FINANCIAL ASSISTANCE AWARDED TO THE B.TECH., DUAL DEGREE, M.SC. (INTEGRATED) STUDENTS FOR THE YEAR 2011-12

Sr. No.	Types of Scholarships	Amount	No. of students
1.	The Institute Merit-cum-Means scholarship with benefit of free tuition	Rs. 1000/-	691
2.	The facilities of free messing (only basic menu) to SC/ST	Basic Menu bill plus pocket allowance of Rs. 250/- p.m. & exemption from payment of Hostel Room Rent	404

3.	Free tuition Facility	only Tuition fee waiver	09
4.	National Talent Search Scholarship (NTS)	Rs. 500/- p.m.	219 approximately
5.	Scholarship from Steel Authority of India Ltd	Rs. 500/- p.m.	01

IIT Bombay Heritage Fund Scholarship

Name of Scholarship	Rate
David J Dunn Schp.	Rs.1000/-p.m.
Vidyadhar and Radhika Kulkarni Schp.	Rs.1000/-p.m.
Dr Vijaya Apte Memorial Schp.	Rs.1000/-p.m.
Jagjivan Ujamashi Talsania Schp.	Rs.1000/-p.m.
Vasant Himatlal Talsania Schp.	Rs.1000/-p.m.
Mr Badriddin Sonawalla Schp.	Rs.1000/-p.m.
Prabhakar D Mahajan Schp.	Rs.1000/-p.m.
Lionel J D'luna Schp.	Rs.1000/-p.m.
T R S Anand & Bhanumati Anand Schp.	Rs.1000/-p.m.
Indira Manidhane Schp.	Rs.1000/-p.m.
Prabhakar D Mahajan Schp.	Rs.1000/-p.m.
Kanitkar Schp.	Rs.1000/-p.m.
Mr & Mrs Ranganathan Schp.	Rs.1000/-p.m.
Shri C K Apte Schp.	Rs.1000/-p.m.
Jayant Sathe Schp.	Rs.1000/-p.m.
Balkrishna K Mundhe Schp.	Rs.1000/-p.m.
Anonymous Schp.	Rs.1000/-p.m.
Anonymous Schp.	Rs.1000/-p.m.
Sandra Lee Purkayastha Schp.	Rs.1000/-p.m.
IIT Bombay Heritage Fund Schp.	Rs.1000/-p.m.
IIT Bombay Heritage Fund Schp.	Rs.1000/-p.m.
Abraham Thomas Schp.	Rs.1000/-p.m.
IIT Alumni @ Microsoft Schp.	Rs.1000/-p.m.
IIT Alumni @ Microsoft Schp.	Rs.1000/-p.m.
P K Sheshambal Schp.	Rs.1000/-p.m.
Dina Nath & Gayatri Nath Schp.	Rs.1000/-p.m.
IIT Alumni @ Microsoft Schp.	Rs.1000/-p.m.
Suresh & Varsha Nihalani Schp.	Rs.1000/-p.m.
Anonymous Schp.	Rs.1000/-p.m.
IIT Bombay Heritage Fund Schp.	Rs.1000/-p.m.
Virendra Kumar Scholarship	Rs.1000/-p.m.
Abhay Himatlal Talsania Schp.	Rs.1000/-p.m.
Mrs. Meenakshi Vishwanathan Schp.	Rs.1000/-p.m.
IIT Alumni @ Microsoft Schp.	Rs.1000/-p.m.
Samir Shah and Prakash Peres Memorial Schp.	Rs.1000/-p.m.
Burjor S Dadyburjor Schp.	Rs.1000/-p.m.
Vidyadhar and Radhika Kulkarni Schp.	Rs.1000/-p.m.
Mr Roop Kumar & Mrs Suraj Devi Agarwal Schp.	Rs.1000/-p.m.
Anisbert & Kumarie Sequeria Schp.	Rs.1000/-p.m.
N S Rajaram Schp.	Rs.1000/-p.m.
Nagesh C Chaudhari Schp.	Rs.1000/-p.m.
Mr S J & Mrs S S Kulkarni Schp.	Rs.1000/-p.m.
Gajendra Chandra Malkar Schp.	Rs.1000/-p.m.
Late Shri Gopaldas Duttani Schp.	Rs.1000/-p.m.

IIT Alumni @ Microsoft Schp.	Rs.1000/-p.m.
Mr. Shantilal H Goradia Schp.	Rs.1000/-p.m.
IIT Bombay Heritage Fund Schp.	Rs.1000/-p.m.
IIT Bombay Heritage Fund Schp.	Rs.1000/-p.m.
Prof M V Hariharan Schp.	Rs.1000/-p.m.
Mrs Minaz Sonawalla	Rs.1000/-p.m.
Usha Purkayastha Schp.	Rs.1000/-p.m.
Narendra Joshi Merit Schp.	Rs.1000/-p.m.
Rajesh Radhakrishnan Schp.	Rs.1000/-p.m.
IIT Alumni @ Microsoft Schp.	Rs.1000/-p.m.
IIT Alumni @ Microsoft Schp.	Rs.1000/-p.m.
IIT Alumni @Microsoft Schp.	Rs.1000/-p.m.
Madho and Radha Agarwal Schp.	Rs.1000/-p.m.
Himangshushekhar Purkayastha Schp.	Rs.1000/-p.m.
George Tharkan Schp.	Rs.1000/-p.m.
Prof Mohan M Kulkarni Schp.	Rs.1500/-p.m.
Prof K Shankar Schp.	Rs.1000/-p.m.
Soonu Dadyburjor Schp.	Rs.1000/-p.m.
Lata Vijaykar Schp.	Rs.1000/-p.m.
Mr Kasamali Virani Schp.	Rs.1000/-p.m.
Abbas Bhatia/John A Martin Schp.	Rs.1000/-p.m.
Bijoya Chaudhari Schp.	Rs.1000/-p.m.
Dr. Kishor M Kulkarni Schp.	Rs.1500/-p.m.
Mrs Ila Chandrakant Schp.	Rs.1000/-p.m.
Bibha Nandi Schp.	Rs.1000/-p.m.
Dwarka Nath Shuklo Baidya Schp.	Rs.1000/-p.m.
Anonymous Schp.	Rs.1000/-p.m.
IIT Bombay Heritage Fund Schp.	Rs.1000/-p.m.
R. N. Limaye Scholarship	Rs.1000/-p.m.
Ruyintan & Monica Mehta Family Foundation Schp	Rs.1000/-p.m.
M Radhakrishna Kamath Scholarship	Rs.1000/-p.m.
Manohar & Sunita Kamat Scholarship	Rs.1500/-p.m.
Mr. S.S. Shiralkar Scholarship	Rs.1000/-p.m.
Indira Manudhane Scholarship	Rs.1000/-p.m.
Dr. G.V. Bakore Memorial Scholarship	Rs.1000/-p.m.
Shri Raman K. Rao Scholarship	Rs.1000/-p.m.
Miss A. J. Majmundar	Rs.1000/-p.m.
Chamanlal and Labhkunwar Kothary Schp.	Rs.1000/-p.m.
Justin Bhansali Memorial Scholarship	Rs.1000/-p.m.
Lakshmi and Kadayam Srinivasan Scholarship	Rs.1000/-p.m.
Kumar and Susan Shah Scholarship	Rs.1000/-p.m.
Vijaya Patil Schp.	Rs.1000/-p.m.
Subodh Ghonge Scholarship	Rs.1000/-p.m.
C.Vimala & M.R.K. Menon Scholarship	Rs.1000/-p.m.
Manohar & Sunita Kamat Scholarship	Rs.1500/-p.m.
Mr G. M. Nabar Scholarship	Rs.1000/-p.m.
Mrs. Jyotsna D Pendse Merit Schp.	Rs.1000/-p.m.
H. J. Talsania Scholarship	Rs.1000/-p.m.
California Scholarship	Rs.1000/-p.m.
California Scholarship	Rs.1000/-p.m.
The Iyer Schp.	Rs.1000/-p.m.
IIT Alumni@Microsoft Scholarship	Rs.1000/-p.m.
Electrical Engg. Deptt. Schp.	Rs.1000/-p.m.
Prabhakar D. Mahajan scholarship	Rs.1000/-p.m.
Subha & Anand Talwalkar Schp.	Rs.2000/-p.m.
Dilip R Limaye Schp.	Rs.2000/-p.m.
Abraham Thomas Schp.	Rs.1000/-p.m.
Prof. G. N. Revenkar Scholarship	Rs.1000/-p.m.

Dr. Chandrakant Thanawala Scholarship	Rs. 1000/- p.m.
Ashish Prasad Nandi Majumdar Scholarship	Rs. 1000/- p.m.
Radha Rani Agarwal Merit Scholarship	Rs. 1000/- p.m.
Dr P Remadevi Menon Memorial Schp.	Rs. 1000/- p.m.
Kanitkar scholarship	Rs. 1000/- p.m.
Mrs. Amrutha Iyengar Schp.	Rs. 1000/- p.m.
Electrical Engg. Deptt. Schp.	Rs. 1000/- p.m.
Lalita Ramanathan Schp	Rs. 1000/- p.m.
Aditya Joshi Schp.	Rs. 1000/- p.m.
S. Ramaritam Scholarship	Rs. 1000/- p.m.
IIT Alumni@Microsoft Scholarship	Rs. 1000/- p.m.
IIT Alumni@Microsoft Scholarship	Rs. 1000/- p.m.
IIT Bombay Heritage Fund Scholarship	Rs. 1000/- p.m.

List of Scholarships/Fellowships

Government Fellowships/Scholarships

Sr. No.	Name of Fellowship/Scholarship	No. of Students	Monthly Fellowship (in Rs.)
1.	DAE (Board of Research in Nuclear Science – BRNS) : M.Tech.	8	Rs. 20,000/-
2.	NBHM (National Board of Higher Mathematics): Ph.D.M.Tech.	107	Rs. 18,000/- Rs. 6,000/-
3.	AERB (Atomic Energy Regulatory Board): M.Tech.	5	Rs. 15,000/-
4.	AICTE National Doctoral Fellowship (All India Council for Technical Education): Ph.D	1	Rs. 18,000/-
5.	Ministry of Urban Development & Poverty Alleviation (CPHEEO): M.Tech.	3	Rs. 4,000/-
6.	DBT-JRF (Department of Biotechnology, Jr. Research Fellowship): Ph.D.	5	Rs. 16,000/-
7.	ICMR (Indian Council of Medical Research): Ph.D.	5	Rs. 16,000/-
8.	MERC (Maharashtra Electricity Regulatory Commission): M.Tech.	7	Rs. 8,000/-
9.	ARCI: Ph.D.	1	Rs. 14,000/-
10.	ICPR	1	Rs. 5,000/-

Private Fellowships/Scholarships

Sr. No.	Name of Fellowship/Scholarship	No. of Students	Monthly Fellowship (in Rs.)
1	TCS (Tata Consultancy Services):		
	M.Tech.	—	9,000/-
	Ph.D.	2	19,000/-
2	Forbes Marshall: M.Tech.	2	14,000/-
3	Crompton Greaves: Ph.D.	14	24,000/-
4	Crompton Greaves: M.Tech.	7	10,000/-
5	Microsoft Research India: Ph.D.	5	16,000/-
6	Dr. Gargi Vishnoi Memorial Scholarship: M.Tech.	2	2,000/-
7	Schulmberger Fellowship: M.Tech.	6	8,000/-
8	British Gas (BG) Fellowship: M.Tech	5	8,000/-
9	Eco-Axis Fellowship - M.Tech	2	5,000/-
10	IITB Monash Ph.D	81	23,333/-
11	ATE Fellowship	1	5,000/-
12	CTI (Compatible Technology International)M.Tech	2	8,000/-
13	FES (Foundation for Ecological Security)Ph.D	1	14,000/-
14	IBM Ph.D	1	15,000/-

Financial Assistance to Postgraduate Students/Research Scholars/M.Tech./M.Des./M.Phil. And M.Sc. (2-Year Programme Students)

Sr. No.	Type of Scholarship	Year/ per month JRF/SRF	Amount	No. of students	
				Institute Scholarship	Other Scholarship (RA)
1.	**Institute Teaching Asistantshop * (Ph.D) (*Revised w.e.f. 01.04.07)**	I & II Year JRF	Rs. 16,000/-	88	06
		III, IV & V Year SRF	Rs. 18,000/-	56	10
		I & II JRF	Rs. 18,000/-	189	02
		III & IV SRF	Rs. 20,000/-	107	01
2.	**Postgraduate Assistantship to:-**				
	M.Tech. Students (2 yr. programme)	I year	Rs. 8,000/-	424	80
		II year	Rs. 8,000/-	493	84
	M.Des. Students (2 yr. programme)	I year	Rs. 8,000/-	44	---
		II year	Rs. 8,000/-	57	---
	M.Phil. Students (2 yr. programme)	I year	Rs. 8,000/-	07	---
		II year	Rs. 8,000/-	11	---
3.	**CSIR Fellowhip to:-**				
	Ph.D Students	JRF	Rs. 16,000/-	97	---
		SRF	Rs. 18,000/-	119	---
	M.Tech Students	JRF	Rs. 16,000/-	4	---
	M.Sc. + Ph.D. Dual Degree	JRF		4	---
	M.Tech. + Ph.D. Dual Degree	JRF		3	---
	Shyama Prasad Mukherjee Fellowship	JRF	Rs. 20,000/-	1	---
4.	**QIP Scholarship to:-**				
	M.Tech. Students	I year	Rs. 4,000/-	8	---
		II year		5	---
	Ph.D. Students		Rs. 9,000/-	48	---
5.	**UGC Scholarship to:-**				
	Ph.D. Students	JRF-HSS	Rs. 16,000/-	67	---
		SRF-HSS	Rs. 18,000/-	33	---
	M.Phil. students	JRF-Engg. & Tech.	Rs. 16,000/-	1	---

Sr. No.	Type of Scholarship	Year/ per month JRF/SRF	Amount	No. of students	
				Institute Scholarship	Other Scholarship (RA)
6.	UGC – Engg. & Tech.	JRF	Rs. 18,000/-	5	---
		SRF	Rs. 20,000/-		
7.	UGC – M.Tech.		Rs. 16,000/-	3	---
8.	UGC – M.Sc + Ph.D		Rs. 16,000/-	1	---
9.	Rajiv Gandhi National Fellowship	SRF	Rs. 14,000/-	2	---

Sr.	Roll No.	Name	Thesis Title	Supervisor / Co-Supervisor / External Supervisor

RECIPIENTS OF THE DEGREE OF DOCTOR OF PHILOSOPHY

Department: Aerospace Engineering

1.	05401002	Pramod Balwantrao Salunkhe	Investigations on Stall Inception and its Control Under Clean and Distorted Inflows in a Single Stage Axial Flow Fan.	Prof.A.M.Pradeep
2.	03401801	Siddappa Mahadev Khot	Evolution of Geometry Based Piezo Patch Placement	Prof. Joshi Ashok
3.	03401002	Narendra Ramchandra Deore	A Cell Vertex Finite Volume Time Domain Method for Solution of Maxwell's Equations.	Prof. Avijit Chatterjee Prof. Pillai Harish
4.	06401703	Shaja A.S.	Insights on Architecture of Engineering Systems.	Prof. Sudhakar K.

Department: Chemical Engineering

1.	05402006	Jigneshkumar Harshadray Parmar	System Level Analysis of Osmotic Effect on Yeast	Prof. Venkatesh K. V. Prof. Bhartiya S.
2.	05402001	Venkat Reddy Pannala	Dynamic Analysis and Characterization of the GAL System in Yeast	Prof. Bhartiya S. Prof. Venkatesh K.V.
3.	05402706	K. Gurudatt	Studies on Moisture Imbibition and Drying in Porous Textiles	Prof. Juvekar V.A. Vikas M. Nadkarni M. Nadkarni
4.	05402008	Vijayakumar R. P.	Processing, Structure and Properties of PVDF Films	Prof. Khakhar D.V. Prof. Ashok Misra
5.	06402002	Arijit Sarkar	Consolidation and Cracking in Drying Colloidal Dispersion	Prof. Tirumkudulu Mahesh
6.	06402006	Daggupati Sateesh	Underground Coal Gasification: Experimental Studies and Computational Flow Modeling	Prof. Sanjay Mahajani Prof. Aghalayam Preeti
7.	05402004	Soumen Kumar Maiti	Modeling, Optimization and Monitoring of Glycopeptide Antibiotic Production	Prof. Wangikar P. Prof. Manibhushan
8.	05402703	Sunil A. P.	Studies on Adsorptive Separation of Argon from Air	Prof. Moharir A.S. Dr. R. V. Jasra
9.	05402007	Anurag Tripathi	Rheology and Segregation of Granular Mixtures	Prof. Khakhar D.V.
10.	07402007	Ravikumar C.	Nanoparticle Formation in Aqueous and Organic Medium: Experiments, Mechanism and Modeling	Prof. Rajdip Bandyopadhyaya

Sr.	Roll No.	Name	Thesis Title	Supervisor / Co-Supervisor / External Supervisor
11.	03402704	Dahe Ganpat Jaywant	Preparation and Characterization of High Flux and Biocompatible Hollow Fiber Membranes for Hemodialysis	Prof. Bellare J.
12.	06402901	Vinay Amte	Process Synthesis of Reactive Distillation Systems for Selectivity Engineering	Prof. Malik R.K. Prof. Sanjay Mahajani
Department: Chemistry				
1.	04403004	Chandrakanta Dash	Triazole Derived N-Heterocyclic Carbene Complexes in Catalytic C-N and C-C Bond Forming Reactions.	Prof. Ghosh Prasenjit
2.	04403315	Selvakumar K.	Studies on Novel Chalcogen Containing Heterocycles as Mimics for Glutathione Peroxidase.	Prof. H. B. Singh
3.	04403003	Ravat Vilas Maruti	Synthesis, Characterization and Catalytic Activity of Microporous and Mesoporous Molecular Sieves.	Prof. A. Datta
4.	04403307	Sachin Kumar	Late Transition Metal Complexes of N/O-Functionalized N-Heterocyclic Carbenes: Synthetic and Catalytic Studies	Prof. Ghosh Prasenjit
5.	05403307	Vijayendra S. S.	Synthesis of Sn(IV) Porphyrin based and Triazole Bridged Unsymmetrical Porphyrin Assemblies and new Meso - Substituted Thiacorroles.	Prof. M. Ravikanth
6.	05403003	Amitabha Acharya	Conjugates of Calix[4] arene and Carbohydrates : Ion and Molecular Recognition and Aggregational Aspects by Spectroscopy and Microscopy Studies.	Prof. C. P. Rao
7.	05403309	Yedukondalu Meesala	Synthesis and Studies of Unsymmetrical Re(I) Bridged and Covalently Linked Porphyrin Arrays.	Prof. M. Ravikanth
8.	05403002	Atanu Mitra	C1- and C2- Based Glyco- Conjugates: Synthesis, Characterization, Ion and Molecular Recognition Studies.	Prof. C. P. Rao
9.	07403601	(Ms) Niki Sweta Jha	Interaction of some Drugs and Biologically Important Cosolute/ Cosolvents with Globular Proteins: Energetics and Conformational Studies.	Prof. Nand Kishore

Sr.	Roll No.	Name	Thesis Title	Supervisor / Co-Supervisor / External Supervisor
10.	05403301	(Ms) Jasmine Sinha	"Click"able Polymers based on 3,4-propylenedioxythiophene and "Click"able Amplified Fluorescent Poly (aryleneethynylene)s based on Pentiptycene and its Applications in Sensing	Prof. Anil Kumar
11.	05403302	(Ms) Shinisha C. B.	Computational Studies on the Origin of Stereoinduction in Asymmetric Organic Reactions.	Prof. R. B. Sunoj
12.	05403304	Pujari Sandip Appaji	New Strategies for the Synthesis of Palmerolide A, Callystatin A and Some Optically Active Benzylic Fluorides.	Prof. Kaliappan K P
13.	07403311	(Ms) Neelam Keshwani	Energetics and Conformational Insights into Solvent and Ligand Binding Effects on Biologically Important Macromolecules : Protein and DNA	Prof. Nand Kishore
14.	07403603	(Ms) Mridula Guin	IR-UV Double Resonance Spectroscopic and Ab-initio Investigations of ð-Stacked and Hydrogen-bounded Complexes in the Gas Phase	Prof. G. Naresh Patwari
15.	05403008	Vijay Pal Singh	Synthesis and Glutathione Peroxidase-like Activity of Selenenate Esters and Selenenamides	Prof. H. B. Singh
16.	05403312	Rajeswara Rao Malakalapalli	Synthesis and Studies of Porphyrin and Boron-dipyrromethene (BODIPY) Based Fluorescent Systems	Prof. M. Ravikanth
17.	05403310	Jugun Prakash Chinta	Ion and Molecular Recognition by Synthetic Receptors : Amino Acid & Protein Binding, Nuclease & Anticancer Activity, and Computational Modeling	Prof. C. P. Rao
Department: Civil Engineering				
1.	06404808	Vivek Balwantrao Deshmukh	Some Studies on uplift Capacity of Pile Anchors and Horizontal Plate Anchors	Prof. Dewaikar D.M. Prof.Choudhury Deepankar
2.	05404802	Keshav Kashinath Sangle	Stability and Seismic Analysis of Cold-formed Steel Storage Rack Structures with Rigid and Semi-rigid Connections	Prof. Bajoria K.M.
3.	07404306	Sharadkumar Purnanand Purohit.	Semi-active Output Feedback Control Studies for Building with Magnetorhelogical Dampers	Prof. N.K.Chandiramani
4.	07404302	Ajaykumar Ramdas Kambekar	Wind Wave Simulation and Forecasting using Artificial Intelligence Techniques	Prof. Deo M.C.

Sr.	Roll No.	Name	Thesis Title	Supervisor / Co-Supervisor / External Supervisor
5.	07404304	Veeranagouda Basanagouda Patil	Vibration Control of the Wind Excited Benchmark Building	Prof. Jangid R.S.
6.	07404303	Shahapure Shrishaila Sivabasapa	Coastal Urban Flood Simulation Using Finite Element Method, Geographical Information Systems and Remote Sensing	Prof. T I Eldho Prof. Rao E.P. Prof. S. K. Mishra
7.	06404001	K.V. R. Ravi Shankar	Modeling of Vehicle-Type Dependent Behaviour in Mixed Traffic Conditions.	Prof. Tom V Mathew
8.	04404302	P. Raja Sekhar	Physical Model Studies on Pollutant Movement in Porous Media	Prof. T I Eldho Prof. Viswanadham B.V.S.
9.	06404805	(Ms) Deepa Vijay Raisinghani	Studies on the Performance of Hybrid Geosynthetic Reinforced Slopes	Prof. Viswanadham B.V.S. Prof. G.L. Shivakumar
10.	06404704	Vedula Srinivasa Phanikanth	Ground Response Analysis and Behaviour of Single Pile in Liquefied Soils During Earthquake	Prof. Choudhury Deepankar Prof. N K Samadhiya
11.	07404001	Suchit Dattatraya Gumaste	Determination of Fabric of Fine-grained Soils	Prof. Singh D.N. Prof. Swami Saran
12.	02404702	Noble Jacob	Assessment of Groundwater Flow and Contaminant Transport Mechanisms in a Multilayered Regional Aquifer System using Isotope Hydrogeochemistry and Numerical Modelling	Prof. T I Eldho Dr. S. Mohan
13.	03404803	Barve Makarand Vasant	Earthquake Response of Torsionally Coupled Structures with Uncertain Parameters	Prof. Banerji P.
14.	06404401	Rajendra Baburao Magar	Real-Time Reservoir Inflow Prediction Using Soft Computing Techniques.	Prof. Jothiprakash V.
15.	07404002	Raghunandan M. E.	Effect on Cyclic Response and Liquefaction Resistance Due to Desaturation of Sand	Prof. A. Juneja Prof. Choudhury Deepankar
16.	03404804	Prashant Chandrakant Bhise	Ultrasonic Wave Propagation in Graded Media with Application to Material Characterization and Damage Detection	Prof. Desai Yogesh M. Prof. Abhijit Mukherjee

Department: Computer Science & Engineering

1.	03405003	Appu Shaji	Optimisation Algorithms for Motion Factorisation.	Prof. Sharat Chandran
2.	03405007	Yogesh Somprakash Murarka	Online Update of Concurrent Object Oriented Programmes.	Prof. Bellur Umesh

Sr.	Roll No.	Name	Thesis Title	Supervisor / Co-Supervisor / External Supervisor
3.	04405001	Sandeep Gopichand Deshmukh	Protein Classification using Sequence and Structure Information.	Prof. Ramamritham Krithi Prof. Wangikar P.
4.	04405702	Ananthakrishnan Ramanathan	Syntactico-Semantic Processing for English-Hindi Statistical Machine Translation.	Prof. Bhattacharya P. Dr. M. Sasikumar
5.	03405803	Ingle Rajesh Baliram	Rekeying in Contributory Group Key Agreement.	Prof. Sivakumar G.
6.	03405802	Aniruddha Jyeshtharaj Rujuta Joshi	Acquisition and Quantitative Analysis of the Arterial Pulse.	Prof. Sharat Chandran
7.	03405601	Hrishikesh Sawalaram Karmarkar	Improved Constructions for Complementation, Disambiguation and Determinization of W-automata.	Prof. Supratik Chakraborty
Department: Earth Sciences				
1.	04406002	Anilkumar Y.	Metamorphic Evolution of Ultrahigh-Temperature Granulites around Karur, Tamil Nadu.	Prof. Patel S.C.
2.	05406301	Yengkhom Kesorjit Singh	Deformation and Tectonic History of Delhi Supergroup of Rocks, around Uplagarh and Sagna, SW Rajasthan, India.	Prof. Biswal T.K.
3.	03406701	Hari V. S. Satyanarayana	Crustal Seismic Structure of Koyna Warna Region.	Prof. Mohan G. Shri. M. Ravi Kumar
4.	06406701	Surendra Roy	Study on Blasting Dust Management System in an Opencast Coal Mine.	Prof. Singh Trilok Nath Dr. G. R. Adhikari
Department: Electrical Engineering				
1.	05407305	Joshi Sanjay Rameshchandra	Analysis of SSR Performance of TCSC Control Schemes using Discrete-Time Models	Prof. Kulkarni A.M.
2.	05407301	Dagadu Shankar More	Design and Analysis of Three-Phase Flux Reversal Machine for Rooftop Wind Power Application	Prof. Fernandes B.G.
3.	05407010	Ravindra Shyam Bhide	Analysis of Transformers and Systems Used in Low- Voltage High-Current Applications.	Prof. Kulkarni S V
4.	04407602	Gautam Hazari	Bottleneck Identification Techniques Leading to Simplified Performance Models for VLSI Memory Systems.	Prof. Desai Madhav
5.	03407006	Priyadarshnam	Analysis and Regularisation of Linear Complementarity Systems	Prof. Pillai Harish

Sr.	Roll No.	Name	Thesis Title	Supervisor / Co-Supervisor / External Supervisor
6.	05407805	Warhade Krishna Keshavrao	Video Shot Boundary Detection	Prof. Merchant S N
7.	04407702	Malay Kumar Nema	Edge Model Based Representation of Laplacian Subbands and its Applications.	Prof. Chaudhuri Subhasis Subrata Rakshit
8.	03407803	Kulkarni Pandurangarao Narayanarao	Speech Processing for Reducing the Effects of Spectral Masking in Sensorineural Hearing Loss	Prof. Pandey P.C.
9.	05407006	Angada B Sachid	Technology-Circuit Co-Design using FINFETs at Sub-22 NM Nodes.	Prof. Rao Ramagopal Prof. M.Shojaei Baghini
10.	05407801	Rajiv Kumar Gupta	Multilayer Directional and Planar Omnidirectional Antennas.	Prof. J.Mukherjee
11.	05407003	(Ms) Deepthi Chander	Multihop Cell Phone Based Sensor Networks	Prof. Desai U.B.
12.	06407010	Gadepalli V.V. Sharma	Performance Analysis of Maximum-Likelihood Detection for Decode and Forward Cooperation in MIMO Relay Channels.	Prof. Desai U.B.
13.	04407806	Vijaykumar Kishanrao Jadhav	A Multi-Model Approach for Efficient Model Building and Simulation of Transient Behavior of MEMS Devices.	Prof. M. B. Patil Prof. M Belur
14.	04407003	Brajesh Pandey	Studies of Some I/O Blocks In Integrated Circuits.	Prof. Chandorkar A.N.
15.	06407011	Shivkumar Venkatraman Iyer	Stability and Operational Issues in the Decentralized Control of an Isolated Microgrid	Prof. M Belur Prof. M. Chandorkar
16.	05407005	Avinash Sudhakar Bhangaonkar	Ultra-High Frequency Simulation, Measurement and Analysis of Some Corona Phenomena	Prof. Kulkarni S V
17.	05407001	Vishweshwara Mohan Rao	Vocal Melody Extraction from Polyphonic Audio with Pitched Accompaniment	Prof. Preeti Rao
18.	04407401	Sudhakar Shankarrao MandE	Variability Aware Performance Evaluation of Nanoscale CMOS Devices and Circuits	Prof. Chandorkar A.N. Prof. Sharma Dinesh
19.	03407007	Rajeev Kumar Gajbhiye	Facilitating Emission Trading within Power Exchange and Advanced Bid Structures for Evolving Electricity Markets.	Prof. Soman S.A.

Sr.	Roll No.	Name	Thesis Title	Supervisor / Co-Supervisor / External Supervisor
20.	07407304	Ranjith Ram A	Content Re-creation for Instructional Video: Technology Enhancement in Distance Education	Prof. Chaudhuri Subhasis
21.	06407008	Shanmuganathan R.	Low Dynamic Range Solutions to the High Dynamic Range Imaging Problem.	Prof. Chaudhuri Subhasis
22.	06407201	Nava Raj Karki	Reliability Worth Assessment of An Electric Utility in a Developing Country.	Prof. A.K. Verma
23.	05407803	Khare Swanand Ravindra	Numerical Issues in Univariate Polynomial Matrices.	Prof. M Belur Prof. Pillai Harish
Department: Humanities & Social Sciences				
1.	06408302	Babu Paul	Intellectual Property Rights and Accessibility of Medicines - A Study with Reference to India	Prof. Ramanathan A Prof. Jha Shishir Kumar
2.	05408703	Savio Sebastian Abreu	New Christian Movements in Contemporary Goa : A Sociological Study	Prof. Robinson Rowena Dr. Vitor Delio Jacinto de Mendonca
3.	02408001	(Ms) Tithi Bhatnagar	Subjective Well-Being in the Indian Context : Concept, Measure and Index.	Prof. Gupta Meenakshi
4.	05408801	(Ms) Neeti	Psychological Strain and Safety Behaviour : A Study on Iron and Steel Plants in India	Prof. Pooja Purang Prof. Gupta Meenakshi
5.	04408808	(Ms) Sangeeta V. Sharma	Socio-Economic Determinants of Household Solid Waste Management in Mumbai	Prof. Trivedi Pushpa Prof. Parthasarathy D.
6.	03408001	Byasa Moharana	Subaltern, Religion and State in Postcolonial India: An Ethnographic Study of the Nirvedia-Bauris of Coastal Orissa.	Prof. Kushal Deb Prof. Robinson Rowena
7.	04408805	(Ms) Rohini Kelkar	Environmental Impact of Trade Liberalisation - A Study Based on Manufacturing Industries in India	Prof. Ramanathan A
8.	03408301	(Ms) Shubha Ranganathan	Making Sense of Suffering : Spirit Possession in Mahanubhav Temples in Maharashtra, India	Prof. Parthasarathy D. Prof. Gupta Meenakshi
9.	04408007	Surya Prakash Upadhyay	A Popular Spiritual Guru in Contemporary Hinduism :A Sociological Study of Asaram Bapu	Prof. Robinson Rowena Prof. Kushal Deb
10.	04408802	Vivek Madhusudan Bhat	Language Variation in Konkani : A Sociolinguistic Perspective	Prof. Malshe M. S.

Sr.	Roll No.	Name	Thesis Title	Supervisor / Co-Supervisor / External Supervisor
11.	04408801	(Ms) Nivedita Dutta	Environmental Regulation and Technical Efficiency : A Study of Chemical Industry in and Around Mumbai	Prof. Narayanan K.
12.	05408001	Priyadarshi Dash	Foreign Exchange Reserves Management in India	Prof. Narayanan K.
13.	04408704	Neelesh V. VernekaR	Nexus between Infrastructure and Economic Growth in India	Prof. Trivedi Pushpa Dr. Rajesh Tiwari
14.	04408809	(Ms) Varsha Singh	Testing Asymmetry in Reward and Punishment in Iowa Gambling Task : An Empirical Investigation	Prof. A. Khan
15.	03408805	(Ms) Mary Rose Vimochana	Environmental Accounting for Oil and Natural Gas Resources in India	Prof. Narayanan K. Prof. Haripriya Gundimeda
16.	05408806	(Ms) Mythili Anoop	Dance as Communication : Performative Semiotics of Mohini Attam	Prof. Malshe M. S.
17.	04408707	Brijesh P.	Exports of Services and Offshore Outsourcing : An Empirical Investigation in the Indian Context	Prof. Trivedi Pushpa Dr. Narendra Jadhav
18.	06408807	Venketeswara Pai R.	A Critical Study of Karanapaddhati of Putumana Somayaji	Prof. K. Ramasubramanian
19.	04408601	(Ms) Smriti Singh	Hindi Infectional Morphology and its Implementation in Language Processing Tools : A Distributed Morphology Approach	Prof. Sarma Vaijayanthi Prof. Bhattacharya P.
20.	05408301	(Ms) Binti Singh	Civil Society Organizations and Urban Governance: A Study of Civil Society-Urban Local Body Partnerships in Mumbai	Prof. Parthasarathy D. Prof. Kushal Deb
Department: Mathematics				
1.	05409004	(Ms) Sangita Yadav	Superconvergent Discontinuous Galerkin Methods for Linear and Nonlinear Elliptic and Parabolic Problems.	Prof. Pani A.K.
2.	04409002	Kadu Ganesh Shivajirao	Ideals of Analytic Deviation One	Prof. Puthenpurakal J Tony
3.	04409304	Pramod Kumar Kewat	On the Exterior Square L-function of GLn	Prof. Ravi Raghunathan
4.	05409007	(Ms) Mousumi Mandal	On the Chern Number of an Ideal	Prof. Verma J.K.

Sr.	Roll No.	Name	Thesis Title	Supervisor / Co-Supervisor / External Supervisor
Department: Mechanical Engineering				
1.	04410803	Durgesh Joshi	Geometry-Driven Manufacturability Analysis of Cast Parts.	Prof. Ravi B.
2.	03410803	Machhindra Jagannath Pable	Optimization of Passive Suspension Systems.	Prof. Seshu P.
3.	05410007	Joglekar Manish Madhav	Analysis and Alleviation of Pull-in Instability in Beam-type Electrostatic MicroactuatorS	Prof. D.N. Pawaskar
4.	05410702	Praveen Nair	A Solution-Mapped High-Resolution Scheme for Hypersonic Heat Flux Prediction.	Prof. Bhalchandra Puranik Prof. Upendra Bhandarkar T Jayachandran
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6.	06411007	Biswajit Panda	Fabrication and Characterization of Carbon Nanotubes Filled Ternary Polymer Blends of Polyamide6, Polypropylene and Acrylonitrile Butadiene Styrene	Prof. Kulkarni Ajit R. Prof. Arup R. Bhattacharyya

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2.	04412301	Patil Prashant Bapuso	Nanostructured Fe-Ag-Al Thin Films and Co/Cu Multilayers : Structural, Microstructural, Magnetic and Magnetotransport Studies.	Prof. Senthilkumar M.
3.	04412005	Koteswara Rao Bommisetti	Magnetic Properties of Some Cu-Based Low-Dimensional and Frustrated Quantum Spin Systems	Prof. Mahajan Avinash V.
4.	05412003	(Ms) Neha Kiritkumar Shah	Experimental Study of ppy Dynamics with WASA-at-cosy	Prof. Varma Raghava
5.	07412004	Ajaya Kumar Nayak	Investigations on the Structural, Magnetic, Magneto-thermal and Magneto-Transport Properties in Ni-Co-Mn-Sb full Heusler System	Prof. Suresh K.G.
6.	05412007	(Ms) Kavita Lalwani	The Measurement of the Branching Ration of a Rare Decay n-> nrr with WASA-at-Cosy	Prof. Varma Raghava
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2.	06417001	(Ms) Anindita Roy	Optimal Design of Wind-Battery Systems for Isolated Application.	Prof. Bandyopadhyay Santanu Prof. Kedare S B
3.	07417302	Kashinath Nimba Patil	Development and Modeling of Carbon Nanotubes (CNTs) Synthesis Process.	Prof. C.S. Solanki Prof. Sanjay Mahajani
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Interdisciplinary Group: Reliability Engineering				
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101.	09307407	Gohil Ghanshyamsinh Vijaysinh	Modelling, Design and Fabrication of Fuel Cell and Ultra Capacitor based Auxiliary Power Support System for Back-up and Transient Stability in a Micro-Grid Environment	Prof. Agarwal Vivek
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Department : Mechanical Engineering – Specialization : Design Engineering

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8.	09310042	Bagi Shirishkumar Appasaheb	Developement of Finite Element of a I-Beam Adapting Refined Plate Theory.	Prof. Shimpi R.P. Prof. Krishna Jonnalagadda
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10.	09310024	Vichare Chaitanya Ashok	Optimization of Non Linear Passive Suspension for Minimizing Road Damage.	Prof. D.N. Pawaskar
11.	09310027	Kulkarni Sachin Ramesh	Stress Analysis of door and windows of Boeing 787 aircraft subjected to out of plane bending and twisting applied at infinity	Prof. Ukadgaonker Vijay
12.	09310032	Hajarathvali Shaik	Design Analysis and Fabrication Process of MEMS Based Loadcell.	Prof. Krishna Jonnalagadda
13.	09310022	Thorat Dhairyasheel J.	Fracture of Curved Plate with an Edge Crack under Combined Extension and Bending Loading.	Prof. Krishna Jonnalagadda
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20.	09310019	Desai Hardikkumar Gunvantrai	Stress Analysis of Door and Windows of Boeing 787 Dreamliner under the Application of Internal Pressure and Internal Shear.	Prof. Ukadgaonker Vijay
21.	09310031	Sargule Chandrakant Motilal	Extension of IP Theory in 3 Dimensions and Establish IP as a Seperate Material Parameter.	Prof. Ukadgaonker Vijay
22.	09310403	Ramajagol Rajkumar M	Studies in the Quasicontinuum: Implementation and Apllication	Prof. Salil Kulkarni
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24.	09310025	Rupnar Nitin Deepak	Design and Development of Experimental Setup for Simulating Explosion of internally Pressurised Burried Pipe.	Prof. Guha Anirban Prof. Viswanadham B.V.S.
25.	09310038	Suraj M R	Study of an Inclined Crack Impinging on a Finite Thickness Interface of a Layered Specimen.	Prof. Salil Kulkarni Prof. Krishna Jonnalagadda
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29.	09310303	Anand P. Savalia	Packaging and Characterization of Micro Pneumatic Servo Actuator.	Prof. Gandhi Prasanna S.
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33.	08310911	Chaitanya Tiwari	Development of an Experimental Setup to Characterize Thin Film Failure.	Prof. Krishna Jonnalagadda
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Department : Mechanical Engineering – Specialization : Manufacturing Engineering				
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Department : Mechanical Engineering – Specialization : Thermal & Fluids Engineering				
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58.	09310008	Diptesh Mukherjee	Experimental Investigation of the Heat Removal Capability of Moderator using a Single Rod Set-up.	Prof. Arunkumar Sridharan
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65.	09310012	Tilak Ram Yadav	Heat transfer and friction factor analysis in one pass square taper duct	Prof. Vedula R.P.
66.	09310052	(Ms) Veena Chaudhary	Investigation on Wood Burning Stove.	Prof. Prabhu S V Prof. Date A.W.
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82.	09310046	Anil Raj P	Simulation of Flow Across a Flexible Airfoil: Effect of Plunging Motion and Neighbors in V- Formation.	Prof. Sharma Atul Prof. Amit Agrawal
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Department : Metallurgical Engineering & Materials Science – Specialization : Materials Science				
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3.	09311025	Keskar Nachiket Avinash	Near Boundary Gradient Zone in Zircaloy-4: Role of Localized shear	Prof. Prita Pant Prof. Samajdar I.
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10.	09311011	M Krishnaiah	ZnO Varistors formed using Nano Crystlline ZnO	Prof. Srinivasa Raman Prof. Kulkarni Ajit R.
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13.	09311410	Suresh Kumar K	Effect of Mechanical Arc Oscillation on FZ/PMZ Cracking Sensitivity of Autofenously Welded Inconel 718	Prof. Raman R.
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Department : Metallurgical Engineering & Materials Science – Specialization : Process Engineering				
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18.	09311037	Vikram M.	Nanoindentation Studies on Lead-based Oxide Glasses	Prof. Prita Pant Prof. Tiwari A.N.
Department : Metallurgical Engineering & Materials Science – Specialization : Steel Technology				
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22.	09311403	Kadhe Dhiraj Madhukar	Modeling of Ladle Furnace	Prof. Ballal N.B. Prof. N.N.Viswanathan
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Interdisciplinary Group : Corrosion Science & Engineering				
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5.	09311411	Sunil Kumar Dekka	Corrosion Behavior of AA-5083-H111 Alloys	Prof. Raja V. S.
6.	09311412	Ratnakar R. V. V. V	Study of Cyclic Hot Corrosion Behaviour of Functionally Graded Thermal Barrier Coatings	Prof. Raja V. S.
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Department : Energy Science and Engineering				
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11.	09317401	Dileep Reddy Pasula	Optimal Investment Portfolio for Renewable Power System.	Prof. D. Suryanarayana Prof. Banerjee Rangan
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Centre for Environmental Science & Engineering				
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10.	09318006	Dhiman Chakraborty	Water Disinfection Studies in Batch Reactors Based on Silver Chloride Coated Surfaces	Prof. Suparna Mukherji Prof. Mukherji Soumyo

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13.	09318201	(Ms) Shraddha Dhakhwa	Minimization of Wastewater Generation by On-site Treatment and Recycling	Prof. Anurag Garg Prof. Bandyopadhyay Santanu
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15.	09318012	Makwana Mayur Mansagarbhai	Biodegradation of Dimethyl And Diethyl Phthalate Esters using an Isolated Bacteria, Achromobacter Denitrificans	Prof. Sumathi Suresh
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75.	09927906	Vishwas Gupta	No Project	
76.	09927907	Samant Gaurav Sanjiv Neeta	No Project	
77.	09927909	Ashish Rijhwani	No Project	
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Department : Earth Sciences Specialization : Geoexploration

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Department : Metallurgical Engineering & Materials Science – Specialization : Metallurgical Process Engg.				
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30.	06D11030	Vijay Kumar Khatod	Development of Hydrophobic Coatings	Prof. Khanna A. S.
31.	06D11038	Siddhartha Jain	Corrosion Management Methodology	Prof. Khanna A. S.
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7	Agrawal Amit	Associate Professor	Ph.D. (University of Delaware)	Mechanical Engg.	Co-opted Member	
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26	Baghini Maryam S.	Assistant Professor (Contractual Basis)	Ph.D. (Sharif University of Technology)	Electrical Engg.	No	
27	Bahadur D.	Professor	Ph.D. (IIT Kanpur)	Met.Engg. & Mat.Sc.	Member	
28	Bairy Ramesh T.S.	Assistant Professor	Ph.D. (University of Hyderabad)	H&SS	No	
29	Bajoria K.M.	Professor	Ph.D. (University of Cambridge)	Civil Engg.	Member	
30	Balachandran Niranjan	Assistant Professor	Ph.D. (The Ohio State University)	Mathematics	No	
31	Balaji P.V.	Professor	Ph.D. (IISc., Bangalore)	Bio-Science & Bio-Engineering	Member	
32	Balaji R.	Assistant Professor	Ph.D. (IIT-Madras)	Civil Engg.	No	
33	Balakrishna M.S.	Professor	Ph.D. (IISc., Bangalore)	Chemistry	Member	

Sr. No.	Name	Designation	Qualification	Deptt.	Senate	Remarks
34	Balan Sudesh	Assistant Professor	M.F.A. (Southern Zllinios University)	I.D.C	No	
35	Balasubramaniam K.R.	Assistant Professor	Ph.D. (Carnegie Mellon University)	Energy Science & Engg.	No	
36	Ballal N.B.	Professor	Ph.D. (IIT Kanpur)	Met.Engg. & Mat.Sc.	Member	
37	Banavar R.N.	Professor	Ph.D. (University of Texas)	Systems & Control	Member	HOD, Systems & Control Engg. Group.
38	Bandyopadhyay B.	Professor	Ph.D. (IIT Delhi)	Systems & Control	Member	
39	Bandyopadhyay Rajdip	Associate Professor	Ph.D. (IISc., Bangalore)	Chemical Engg.	No	
40	Bandyopadhyay Santanu	Professor	Ph.D. (IIT Bombay)	Energy Science & Engg.	Member	
41	Banerjee Rangan	Professor, Convener ESE Group	Ph.D. (IIT Bombay)	Energy Science & Engg.	Member	
42	Banerjee Rinti	Professor	Ph.D. (IIT Bombay)	Bio-Sciences & Bio-Engineering	Member	
43	Banerjee Santanu S.	Professor	Ph.D. (University of Jadavpur)	Earth Sciences	Member	
44	Banerjee Sauvik	Assistant Professor	Ph.D. (University of California)	Civil Engg.	No	
45	Banerji Pradipta	Professor	Ph.D. (University of California)	Civil Engg.	Member	Prof.-in-Charge, IIT-Monash Research Academy
46	Bapat S.L.	Professor	Ph.D. (IIT Delhi)	Mechanical Engg.	Member	
47	Bapat Varadraj B.	Assistant Professor	Ph.D. (IIT Bombay)	SJMSOM	No	
48	Bapat Vijay P.	Professor	B.E. (Sangli) DIIT (IIT Bombay)	I.D.C	Member	
49	Baskar S.	Assistant Professor	IISc., Bangalore	Mathematics	No	
50	Basu Somnath	Assistant Professor	Ph.D. (Royal Institute of Technology)	Met.Engg. & Mat.Sc.	No	
51	Bellare Jayesh	Professor	Ph.D. (University of Minnesota)	Chemical Engg.	Member	
52	Bellur Umesh R.	Professor	Ph.D. (Syracuse)	CS & E	No	
53	Belur Madhu N.	Associate Professor	Ph.D. (Univ. of Groningen)	Electrical Engg.	No	
54	Bhandakkar Tanmay K.	Assistant Professor (Contractual Basis)	Ph.D. (Brown University)	Mechanical Engg.	No	
55	Bhandarkar Upendra	Assistant Professor	Ph.D. (University of Minnesota)	Mechanical Engg.	No	
56	Bharatiya Sharad	Associate Professor	Ph.D. (Oklahama State University)	Chemical Engg.	No	
57	Bhargava Parag	Professor	Ph.D. (Univ. of Birmingham & Uni. of Alabama in Guntsville)	Met.Engg. & Mat.Sc.	Member	
58	Bhargava S.	Professor	Ph.D. (University of Gujarat)	SJMSOM	Member	
59	Bhat P. Jayadeva	Professor	Ph.D. (IISc., Bangalore)	Bio-Sciences & Bio-Engineering	Member	
60	Bhat Parameshwar R.	Professor	Ph.D. (IIT Kanpur)	H&SS	Member	
61	Bhattacharya Avik M.	Assistant Professor	Ph.D. (Telecom ParisTech, France)	CSRE	No	
62	Bhattacharyya Arup R.	Associate Professor	Ph.D. (IIT Delhi)	Met.Engg. & Mat.Sc.	No	
63	Bhattacharyya Pushpak		Professor	Ph.D. (IIT Bombay)	CS & E	Member
64	Bhattacharyya Surajit	Assistant Professor	Ph.D. (IIT Kanpur)	H&SS	No	

Sr. No.	Name	Designation	Qualification	Deptt.	Senate	Remarks
65	Bhattacharyya Tanmay	Assistant Professor	P.G.D. (IIT Bombay)	H&SS	No	
66	Bhaumik Prasenjit	Assistant Professor	Ph.D. University of OULU	Bio-Sciences & Bio-Engineering	No	
67	Bhujade M.R.	Professor	Ph.D. (IIT Bombay)	CS & E	Member	
68	Bhushan Mani	Assistant Professor	Ph.D. (IIT Bombay)	Chemical Engg.	No	
69	Biswal T.K.	Professor	Ph.D. (University Rajasthan)	Earth Sciences	Member	
70	Biswas Supratim	Professor	Ph.D. (IIT Kharagpur)	CS & E	Member	
71	Bodi Kowsik V R	Assistant Professor (Contractual Basis)	Ph.D. (IIT-Madras)	Aerospace Engg.	No	
72	Borkar V. S.	Professor	P.h.D. (University of California)	Electrical Engg.	Member	
73	Bose Manaswita	Assistant Professor	Ph.D. (IISc., Bangalore)	Energy Science & Engg.	No	
74	Chakrabarti Debraj	Assistant Professor	Ph.D. (University of Wisconsin-Madison)	Mathematics	No	
75	Chakrabarti Soumen	Associate Professor	Ph.D. (University of California)	CS & E	No	
76	Chakrabarti Subhananda	Associate Professor	Ph.D. (University of Calcutta)	Electrical Engg.	No	
77	Chakraborty Debraj	Assistant Professor	Ph.D. (University of Florida)	Electrical Engg.	No	
78	Chakraborty Paulomi	Assistant Professor (Contractual Basis)	Ph.D. (University of Alberta)	H&SS	No	
79	Chakraborty Supratik	Associate Professor	Ph.D. (The Leland Stanford Jr. University)	CS & E	No	
80	Chakravarthy B. K.	Professor	M.Des. (IIT Bombay)	I.D.C	Member	
81	Chandiramani N.K.	Professor	Ph.D. (Virginia Tech.)	Civil Engg.	No	
82	Chandorkar A.N.	Professor	Ph.D. (Rajasthan Univ.)	Electrical Engg.	Member	
83	Chandorkar Mukul C.	Professor	Ph.D. (Univ. of Wisconsin Madison)	Electrical Engg.	Member	
84	Chandran Sharat	Professor	Ph.D. (Univ. of Maryland)	CS & E	Member	
85	Chandrasekharam D.	Professor	Ph.D. (IIT Bombay)	Earth Science	Member	
86	Chaporkar Prasanna S.	Associate Professor	Ph.D. (University of Pennsylvania – Philadelphia)	Electrical Engg.	No	
87	Chatterjee Avijit	Professor	Ph.D. (IIT Bombay)	Aerospace Engg.	Member	
88	Chatterjee Kishore	Professor	Ph.D. (IIT Kanpur)	Electrical Engg.	Member	
89	Chaudhari Sanjeev	Professor	Ph.D. (IIT Kanpur)	CESE	Member	
90	Chaudhari Subhasis	Professor	Ph.D. (University of California)	Electrical Engg.	Member	
91	Chaudhuri Parag Kumar	Assistant Professor	Ph.D. (IIT Delhi)	CS & E	No	
92	Chebrolu Kameswari	Assistant Professor	Ph.D. (UCSD, California)	CS & E	No	
93	Choudhary Deepankar	Associate Professor	Ph.D. (IISc, Bangalore)	Civil Engg.	No	
94	Chowdhury Arindam	Assistant Professor	Ph.D. (University of Carnegic Mellon)	Chemistry	No	
95	Contractor A.Q.	Professor	Ph.D. (IIT Bombay)	Chemistry	Member	
96	Damani Om P.	Associate Professor	Ph.D. (University of Texas at Austin)	CS & E	Co-opted Member	
97	Das Ashish	Professor	Ph.D. (I.A.S.R.I)	Mathematics	Member	

Sr. No.	Name	Designation	Qualification	Deptt.	Senate	Remarks
98	Das Dibyendu	Associate Professor	Ph.D. (University of Bombay)	Physics	No	
99	Das Pragya	Associate Professor	Ph.D. (TIFR)	Physics	No	
100	Dasaka Satyanarayana M.	Assistant Professor	Ph.D. (IISc., Bangalore)	Civil Engg.	No	
101	Date Prashant P.	Professor	Ph.D. (IIT Madras)	Mechanical Engg.	Member	
102	Datta Sambhu N.	Professor	Ph.D. (University of Virginia)	Chemistry	Member	
103	De Amitava	Professor	Ph.D. (IIT Kanpur)	Mechanical Engg.	Member	
104	Deb Kushal	Associate Professor	Ph.D. (University of Hyderabad)	H&SS	No	
105	Deo Makrand C.	Professor	Ph.D. (IIT Bombay)	Civil Engg.	Member	
106	Desai Madhav P.	Professor	Ph.D. (University of IlliNois)	Electrical Engg.	Member	
107	Desai Uday B.	Professor	Ph.D. (The John Hopkins Univ.)	Electrical Engg.	Member	
108	Desai Yogesh M	Professor	Ph.D. (University of Manitoba)	Civil Engg	Member	
109	Dey Bikash Kumar	Associate Professor	Ph.D. (IISc., Bangalore)	Electrical Engg.	No	
110	Dhamdhere D.M.	Professor	Ph.D. (IIT Bombay)	CS & E	Member	
111	Dhar Subhabrata	Assistant Professor	PH.D (M.S. University, Baroda)	Physics	No	
112	Dikshit Anil Kumar	Professor	Ph.D. (University of Cornell)	CESE	Member	
113	Diwan Ajit A.	Professor	Ph.D. (IIT Bombay)	CS & E	Member	
114	Doolla Suryanarayana D.	Assistant Professor	Ph.D. (IIT Delhi)	Energy Science & Engg.	No	
115	Doshi Jagdeep B.	Professor	Ph.D. (University of California)	Mechanical Engg.	Member	
116	Durani Susheel J.	Professor	Ph.D. (Jammu)	Chemistry	Member	
117	Durbha Surya	Assistant Professor	Ph.D. (Mississippi State University, Mississippi)	CSRE	No	
118	Dusane O.R.	Professor	Ph.D. (University of Pune)	Met.Engg. & Mat.Sc.	Member	HOD, Met. Engg. & Mat. Sci. Dept.
119	Dutta Anindya	Associate Professor	Ph.D. (University of Jadavpur)	Chemistry	No	
120	Dutta Pankaj	Assistant Professor	Ph.D. (IIT Kharagpur)	SJMSOM	No	
121	Dutta Suryendu	Assistant Professor	Ph.D. (RWTH Aachen University)	Earth Science	No	
122	Duttagupta S.P.	Assistant Professor	Ph.D.(University of Rochester)	Electrical Engg.	No	
123	Eldho Iype T.	Professor	Ph.D. (IIT Bombay)	Civil Engg.	Member	
124	Enamundram Chandrasekhar	Associate Professor	Ph.D. (University of Mumbai)	Earth Sciences	No	
125	Fernandes Baylon G.	Professor	Ph.D. (IIT Bombay)	Electrical Engg.	Member	
126	Fernandes Rodney A.	Associate Professor	Ph.D. (University of Pune)	Chemistry	No	
127	Gadre Vikram M.	Professor	Ph.D. (IIT Delhi)	Electrical Engg.	Member	
128	Gaitonde U.N.	Professor	Ph.D. (IIT Bombay)	Mechanical Engg.	Member	
129	Gandhi Prasanna S.	Associate Professor	Ph.D. (University of Rice)	Mechanical Engg.	No	
130	Ganesh Anuradha	Professor	Ph.D. (IIT Delhi)	Energy Science & Engg.	Member	HOD, ES&E Dept.
131	Ganguly Swaroop	Assistant Professor	Ph.D. (University of Texas)	Electrical Engg.	No	
132	Ganguly Udayan	Assistant Professor	Ph.D. (Cornell University)	Electrical Engg.	No	

Sr. No.	Name	Designation	Qualification	Deptt.	Senate	Remarks
133	Garg Anurag	Assistant Professor	Ph.D. (IIT, Roorkee)	CESE	No	
134	Garge Shripad M.	Assistant Professor	Ph.D. (University of Allahabad)	Mathematics	No	
135	Gedam Shirishkumar S.	Associate Professor	Ph.D. (IIT Bombay)	CSRE	No	
136	George Siby K.	Assistant Professor	Ph.D. (NEHU Univ. Shillog)	H&SS	No	
137	Ghorpade S.R.	Professor	Ph.D. (Purdue Univ.)	Mathematics	Member	
138	Ghosh Santanu K.	Assistant Professor	Ph.D. (Jadavpur University)	Bio-Sciences & Bio-Engineering	No	
139	Ghosh Atanu	Professor	M.Tech. (IIT Delhi), P.G. Diploma in Mgmt. (IIM Ahemedabad)	SJMSOM	Member	
140	Ghosh Prakashchandra	Assistant Professor	Ph.D. Technical Univ. of Aachem	Energy Science & Engg.	No	
141	Ghosh Prasenjit	Associate Professor	Ph.D. (University of Columbia)	Chemistry	No	
142	Ghosh Siddhartha	Associate Professor	Ph.D. (Univ. of Michigan)	Civil Engg.	No	
143	Ghosh Subimal	Assistant Professor	Ph.D. (IISc. Bangalore)	Civil Engg.	No	
144	Golay Pravesh J.	Assistant Professor	Ph.D. (Pune University)	H&SS	No	
145	Gopal R. Patil	Assistant Professor	Ph.D. (Remsselaer Polytechnic Institute, Troy)	Civil Engg.	No	
146	Gopalan Prakash	Professor	Ph.D. (Purdue Univ.)	Met.Engg. & Mat.Sc.	Member	
147	Gopalan Rajaraman	Assistant Professor	Ph.D. (University of Manchester, UK)	Chemistry	No	
148	Goyal Alok	Professor	Ph.D. (California)	Civil Engg.	Member	
149	Guha Anirban	Assistant Professor	Ph.D. (IIT Delhi)	Mechanical Engg.	No	
150	Gumaste Ashwin Anil	Associate Professor	Ph.D. (University of Texas)	CS & E	No	
151	Gundimeda Haripriya S.	Associate Professor	Ph.D. (Indira Gandhi Institute of Development)	H&SS	No	
152	Gupta Dipti	Assistant Professor	Ph.D. (IIT Kanpur)	Met.Engg. & Mat.Sc.	No	
153	Gupta Kapil	Professor	Ph.D. (Univ.of Sheffield)	Civil Engg	Member	
154	Gupta Meenakshi S.	Professor	Ph.D. (IIT Kanpur)	H&SS	Member	
155	Gupta Rajesh	Assistant Professor	Ph.D (IIT Delhi)	Energy Science & Engg.	No	
156	Gupta Shalabh	Assistant Professor	Ph.D. (University of California)	Electrical Engg.	No	
157	Guruprasad Padubidri J.	Assistant Professor (Contractual Basis)	Ph.D. (Texas A & M Univ.)	Aerospace Engg.	No	
158	Gururajan M.P.	Assistant Professor	Ph.D. (IISc., Bangalore)	Met.Engg. & Mat.Sc.	No	
159	Hablani Hari B.	Professor (Contract)	Ph.D. (IISc., Bangalore)	Aerospace Engg.	No	
160	Hemachandra N.	Professor	Ph.D. (IISc., Bangalore)	I.E. & O.R.	Member	HOD, IE&OR
161	Huber Hans	Associate Professor (Contractual Basis)	Ph.D. (Geneva)	SJMSOM	No	
162	Inamdar Mandar M.	Assistant Professor	Ph.D (California Institute of Tech.)	Civil Engg.	No	
163	Innamdar Arun B.	Associate Professor	Ph.D. (IIT Bombay)	CSRE	No	
164	Iyer Sridhar R.	Associate Professor	Ph.D. (IIT Bombay)	CS & E	No	
165	Iyer Kannan N.	Professor	Ph.D. (University of Purdue)	Mechanical Engg.	Member	
166	Jadhav G.N.	Professor	Ph.D. (IIT Bombay)	Earth Sciences	Member	

Sr. No.	Name	Designation	Qualification	Deptt.	Senate	Remarks
167	Jadhav Sameer R.	Assistant Professor	Ph.D. (John Hopkins Univ.)	Chemical Engg.	No	
168	Jagarlapudi Saketha Nath R.	Assistant Professor	Ph.D. (IISc., Bangalore)	CS & E	No	
169	Jain Karuna	Professor	Ph.D. (IIT Kharagpur)	SJMSOM	Member	HOD, SJMSOM
170	Jangid R.S.	Professor	Ph.D. (IIT Delhi)	Civil Engg.	Member	
171	Jha Shishir Kumar	Associate Professor	Ph.D. (Syracuse Univ.)	SJMSOM	No	
172	Jog S.D.	Assistant Professor	Ph.D. (IIT Bombay)	Mechanical Engg.	No	
173	John Joseph	Professor	Ph.D. (Birmingham, UK)	Electrical Engg.	Member	
174	Jonnalagadda Krishna N.	Assistant Professor	Ph.D. (University of Illinois)	Mechanical Engg.	No	
175	Joshi Kapil D.	Professor	Ph.D. (Indiana)	Mathematics	Member	
176	Joshi Anirudha N.	Associate Professor	M.Tech. (IIT Bombay)	I.D.C.	No	
177	Joshi Ashok	Professor	Ph.D. (IIT Bombay)	Aerospace Engg.	Member	Prof.-in-Charge, CEP/QIP
178	Joshi Purba	Assistant Professor	M.Des. (IIT Bombay)	I.D.C.	No	
179	Joshi R.K.	Professor	Ph.D. (IIT Madras)	CS & E	Member	
180	Joshi R.R	Professor	Ph.D. (IIT Bombay)	Mathematics	Member	
181	Joshi Suhas	Professor	Ph.D. (IIT Bombay)	Mechanical Engg.	Member	
182	Jothiprakash V.	Associate Professor	Ph.D. (IIT-Madras)	Civil Engg.	No	
183	Juneja Ashish	Associate Professor	Ph.D. (National University of Singapore)	Civil Engg.	No	
184	Juvekar V.A.	Professor	Ph.D. (IIT Bombay)	Chemical Engg.	Member	
185	Kaliappan Krishna P.	Professor	Ph.D. (IISc., Bangalore)	Chemistry	Member	
186	Kantimay S. Das Gupta	Assistant Professor	Ph.D. (IISc., Bangalore)	Physics	No	
187	Karandikar Abhay	Professor	Ph.D. (IIT Kanpur)	Electrical Engg.	Member	HOD, Electrical Engg. Dept.
188	Karmakar Subhankar	Assistant Professor	Ph.D. (IISc., Bangalore)	CESE	No	
189	Kashyap B.P.	Professor	Ph.D. (IIT Kanpur)	Met.Engg. & Mat.Sc.	Member	
190	Kathuria Vinish Kumar	Associate Professor	Ph.D. (Indira Gandhi Inst. of Development Research)	SJMSOM	No	
191	Keshari Manoj K.	Assistant Professor	Ph.D. (TIFR)	Mathematics	No	
192	Khakhar D.V.	Director/ Professor	Ph.D. (University of Massachusetts Amherst)	Chemical Engg.	Member	
193	Khan Azizuddin	Assistant Professor	Ph.D. (IIT Kanpur)	H&SS	No	
194	Khanna Anand S.	Professor	Ph.D. (Madras Univ.)	Met.Engg. & Mat.Sc.	Member	
195	Khaparde S.A.	Professor	Ph.D. (IIT Kharagpur)	Electrical Engg.	Member	
196	Khedkar Uday P.	Professor	Ph.D. (IIT Bombay)	CS & E	Member	
197	Khire M.V.	Associate Professor	Ph.D. (IIT Bombay)	CSRE	No	
198	Khosla N.K.	Professor	Ph.D. (IIT Kanpur)	Met.Engg. & Mat.Sc.	Member	In-charge, ASC
199	Kiran Kondabagil R.	Assistant Professor	Ph.D. in Biochemistry (University of Mysore)	Bio-Sciences & Bio-Engineering	No	
200	Kotha Sambasivarao	Professor	Ph.D. (University of Hyderabad)	Chemistry	Member	

Sr. No.	Name	Designation	Qualification	Deptt.	Senate	Remarks
201	Kottantharayil Anil	Associate Professor	Ph.D. (Universitat der Bhundeswehr, Munich, Germany)	Electrical Engg.	Co-opted Member	
202	Krishna V. Kaipa	Assistant Professor (Contractual Basis)	Ph.D. (University of Maryland)	Mathematics	No	
203	Kulkarni A.R.	Professor	Ph.D. (IIT Kharagpur)	Met.Engg. & Mat.Sc.	Member	
204	Kulkarni A.M.	Professor	Ph.D. (IISc., Bangalore)	Electrical Engg.	Member	
205	Kulkarni Malhar A.	Associate Professor	Ph.D. (University of Pune)	H&SS	Co-opted Member	
206	Kulkarni Mrinmoyi	Assistant Professor	Ph.D. (State Univ.of New York)	H&SS	No	
207	Kulkarni Purushottam S.	Assistant Professor	Ph.D. (University of Massachusets)	CS & E	No	
208	Kulkarni Rekha P.	Professor	Ph.D. (IIT Bombay)	Mathematics	Member	
209	Kulkarni Salil S.	Assistant Professor	Ph.D. (University of Cornell)	Mechanical Engg.	No	
210	Kulkarni Srikrishna V.	Professor	Ph.D. (IIT Bombay)	Electrical Engg.	Member	
211	Kulkarni Suvarn S.	Assistant Professor	Ph.D. (University of Pune)	Chemistry	No	
212	Kumar Anil	Professor	Ph.D. (IISc., Bangalore)	Chemistry	Member	
213	Kumar Animesh N	Assistant Professor	Ph.D. (University of California)	Electrical Engg.	No	
214	Kumar Ashutosh	Assistant Professor	Ph.D. (Tata Institute of Fundamental Research)	Bio-Sciences & Bio-Engineering	No	
215	Kumar Girish	Professor	Ph.D. (IIT Kanpur)	Electrical Engg.	Member	
216	Kumar Hemant Singh	Associate Professor	Ph.D. (Freie Univ., Berlin)	Earth Sciences	No	
217	Kumar Sudarshan	Associate Professor	Ph.D. (IISc., Bangalore)	Aerospace Engg.	No	
218	Kundu Tapanendu	Professor	Ph.D. (Jadavpur Univ.)	Physics	Member	
219	Kusre Anand T.	Professor (Contractual Basis)	M.Tech. (IIT Bombay) / Diploma in Business Finance (ICFAI)	SJMSOM	Member	
220	Laha Apurba	Assistant Professor	Ph.D. (IISc, Bangalore)	Electrical Engg.	No	
221	Lahiri G.K.	Professor	Ph.D. (University of Jadavpur)	Chemistry	Member	
222	Leena Vachhani	Assistant Professor	Ph.D. (IIT Madras)	Systems & Control Engg.	No	
223	Limaye Nutan	Assistant Professor (Contractual Basis)	Ph.D. (Homi Bhabha National Institute)	CS & E	No	
224	Lodha Saurabh	Assistant Professor	Ph.D. (Purdue University)	Electrical Engg.	No	
225	M.V.R. Murti	Associate Professor	Ph.D. (IIT Bombay)	CSRE	No	
226	Mahajan Avinash V.	Professor	Ph.D. (Iowa)	Physics	Member	
227	Mahajan Swapneel	Associate Professor	Ph.D. (Cornell Univ.)	Mathematics	No	
228	Mahajani Sanjay	Professor	Ph.D. (University of Bombay)	Chemical Engg.	Member	
229	Mahapatra Souvik	Professor	Ph.D. (IIT Bombay)	Electrical Engg.	Member	
230	Mahulikar S.P.	Professor	Ph.D. (Nanyang Tech. Univ., Singapore)	Aerospace Engg.	Member	
231	Maiti Debabrata	Assistant Professor	Ph.D. (The Johns Hopkins University)	Chemistry	No	
232	Maiti S.K.	Professor	Ph.D. (IIT Bombay)	Mechanical Engg.	Member	
233	Maji Samir K.	Assistant Professor	Ph.D. (Jadavpur University)	Bio-Sciences & Bio-Engineering	No	
234	Major Syed S.	Professor	Ph.D. (IIT Delhi)	Physics	Member	

Sr. No.	Name	Designation	Qualification	Deptt.	Senate	Remarks
235	Malik Ranjan K.	Professor	Ph.D. (Wisconsin Madison Univ.)	Chemical Engg.	Member	
236	Mallick Sudhanshu	Assistant Professor	Ph.D. (Purude University)	Met.Engg. & Mat.Sc.	No	
237	Malshe Milind S.	Professor	Ph.D. (Bombay Univ.)	H&SS	Member	
238	Manchanda Rohit	Professor	Ph.D. (Oxford Univ.)	Bio-Sciences & Bio-Engineering	Member	
239	Mandal J.C.	Professor	Ph.D. (IISc. Bangalore)	Aerospace Engg.	Member	
240	Mandal J.N.	Professor	Ph.D. (IISc. Bangalore)	Civil Engg.	Member	
241	Manik D.N.	Professor	Ph.D. (Auburn Univ.)	Mechanical Engg.	Member	
242	Manjunath D.	Professor	Ph.D. (Rensselaer Polytechnic, New York)	Electrical Engg.	Member	HOD, Computer Centre
243	Mathew George	Associate Professor	Ph.D. (M.S. Univ.)	Earth Sciences	No	
244	Mathew Tom V	Associate Professor	Ph.D. (IIT Madras)	Civil Engg.	No	
245	Mathur Pradeep	Professor	Ph.D. (University of Keel)	Chemistry	Member	
246	Mehra Anurag	Professor	Ph.D. (University of Bombay)	Chemical Engg.	Member	
247	Mehra Sarika	Assistant Professor	Ph.D. (University of Minessota)	Chemical Engg.	No	
248	Menezes Viren	Associate Professor	Ph.D. (IISc., Bangalore)	Aerospace Engg.	No	
249	Menezes Bernard L	Professor	Ph.D. (University of Texas)	CS & E	Member	
250	Merchant S.N.	Professor	Ph.D. (IIT Bombay)	Electrical Engg.	Member	
251	Mishra M.K.	Professor	Ph.D. (University of Florida)	Chemistry	Member	
252	Mishra Saurabh	Assistant Professor	Ph.D. (Pennsylvania State Univ.	Met.Engg. & Mat.Sc.	No	
253	Mishra Trupti	Assistant Professor	Ph.D. (IIT Kharagpur)	SJMSOM	No	
254	Misra D.S.	Professor	Ph.D. (IIT Kanpur)	Physics	Member	
255	Mitra Mira	Assistant Professor	Ph.D. (IISc., Bangalore)	Aerospace Engg.	No	
256	Mitra Sagar	Assistant Professor	Ph.D. (IISc., Bangalore)	Energy Science & Engg.	No	
257	Mohan B.K.	Associate Professor	Ph.D. (IIT Bombay)	CSRE	No	
258	Mohan Gollapally	Professor	Ph.D. (ISM Dhanbad)	Earth Sciences	Member	
259	Mohanty Raja	Associate Professor	M.Des. (IIT Bombay)	I.D.C.	No	
260	Moharir Arun S.	Professor	Ph.D. (IIT Kanpur)	Chemical Engg.	Member	
261	Momaya Kirankumar S.	Professor	Ph.D. (University of Toronto)	SJMSOM	Member	
262	Moudgalya Kannan	Professor	Ph.D. (Rice Univ., Houston)	Chemical Engg.	Member	
263	Mujumdar P.M.	Professor	Ph.D. (IIT Bombay)	Aerospace Engg.	Member	HOD, CASDE
264	Mukherjee Asmita	Associate Professor	Ph.D. (TIFR)	Physics	No	
265	Mukherjee Indrajit	Assistant Professor	Ph.D. (IIT Kaharagpur)	SJMSOM	No	
266	Mukherjee Jayanta	Associate Professor	Ph.D. (The Ohio State Univ., Columbus, USA)	Electrical Engg.	No	
267	Mukherjee Soumyajit	Assistant Professor	Ph.D. (IIT Roorke)	Earth Sciences	No	
268	Mukherjee Soumyo	Professor	Ph.D. (Univ. of Colarado)	Bio-Sciences & Bio-Engineering	Member	HOD, CRNTS & SAIF
269	Mukherjee Suparna	Professor	Ph.D. (University of Michigan)	CESE	Member	

Sr. No.	Name	Designation	Qualification	Deptt.	Senate	Remarks
270	Mukhopadhyay Amartya	Assistant Professor (Contractual Basis)	Ph.D. (University of Oxford, UK)	Met.Engg. & Mat.Sc.	No	
271	Mukhopadhyay Siuli	Assistant Professor	Ph.D. (University of Florida)	Mathematics	No	
272	Mukul Malay	Associate Professor	Ph.D. (University of Rochester)	Earth Sciences	No	
273	Munshi Kishori lal	Professor	P.G.D. (IIT Bombay)	I.D.C	Member	
274	Murthy Sahana	Assistant Professor	Ph.D. (Rutgers University)	C-DEEP	No	
275	Murthy Sahana	Assistant Professor	Ph.D. (Rutgers University)	C-DEEP	No	
276	Nagaraja G.	Professor	Ph.D. (IISc., Bangalore)	CS & E	Member	
277	Nagarajan R.	Associate Professor	Ph.D. (IIT Bombay)	CSRE	No	
278	Nair Pradeep	Assistant Professor (Contractual Basis)	Ph.D. (Purdue University)	Electrical Engg.	No	
279	Namboothiri I.N.N.	Professor	Ph.D. (IISc., Bangalore)	Chemistry	Member	
280	Nambudiripad N.	Associate Professor	Ph.D. (Oxford Univ.)	Physics	No	
281	Nanavati Hemant J.	Associate Professor	Ph.D. (Georgia Instt.of Technology)	Chemical Engg	No	
282	Nand Kishore	Professor	Ph.D. (IIT Delhi)	Chemistry	Member	
283	Nandi Basanta Kumar	Associate Professor	Ph.D. (Utkal University)	Physics	No	
284	Nanthagopalan Prakash	Assistant Professor (Contractual Basis)	Ph.D. (IIT Madras)	Civil Engg.	No	
285	Narasimhan K	Professor	Ph.D. (Purdue Univ.)	Met.Engg. & Mat.Sc.	Member	
286	Narayanan Harihar	Professor	Ph.D. (IIT Bombay)	Electrical Engg.	Member	
287	Narayanan Krishna S.	Associate Professor	Ph.D. (IIT Madras)	CS & E	No	
288	Narayanan Krishnan	Professor	Ph.D. (Univ. of Delhi)	H&SS	Member	HOD, HSS Dept.
289	Narayanan N C.	Associate Professor	Ph.D. (ISS, The Hague, the Netherlands)	CTARA	No	
290	Narayanan Vishnu	Assistant Professor	Ph.D (University of California)	I.E. & O.R.	No	
291	Nataraj Neela	Associate Professor	Ph.D. (IIT Delhi)	Mathematics	No	
292	Nataraj P.S.V.	Professor	Ph.D. (IIT Madras)	Systems & Control & Engg.	Member	
293	Nath Rajakishore	Assistant Professor	Ph.D. (Central Univ., Hyderabad)	H&SS	No	
294	Nayak Jayant K.	Professor	Ph.D. (IIT Delhi)	Energy Science & Engg.	Member	
295	Neergat Manoj	Assistant Professor	Ph.D. (Indian Institute of Science, Bangalore)	Energy Science & Engg.	No	
296	Noronha Santosh B.	Assistant Professor	Ph.D. (Univ. of Maryland, Baltimore County)	Chemical Engg.	No	
297	P. Vedagiri	Assistant Professor	Ph.D. (IIT Madras)	Civil Engg.	No	
298	P.I. Pradeep Kumar	Assistant Professor	Ph.D. (Uppasala University, Sweden)	Chemistry	No	
299	Padhi Puja	Assistant Professor	Ph.D. (Univ. of Hyderabad)	H&SS	No	
300	Panda Dulal	Professor	Ph.D. (Jadavpur Univ.)	Bio-Sciences & Bio-Engineering	Member	
301	Panda Ranjan K.	Associate Professor	Ph.D. (University of Hyderabad)	H&SS	No	
302	Panda Ratikanta	Assistant Professor	Ph.D. (University of Hyderabad)	H&SS	No	
303	Pandalai Hari S.	Professor	Ph.D. (ISM)	Earth Sciences	Member	

Sr. No.	Name	Designation	Qualification	Deptt.	Senate	Remarks
304	Pande Kanchan	Professor	Ph.D. (Gujarat Univ.)	Earth Sciences	Member	HOD, Earth Sciences Dept.
305	Pande Sanjay S.	Professor	Ph.D. (IIT Bombay)	Mechanical Engg.	Member	
306	Pandey Ashish	Assistant Professor	MBA (University Institute of Management)	SJMSOM	No	
307	Pandey Prem C.	Professor	Ph.D. (University of Toronto)	Electrical Engg.	Member	
308	Pani A.K.	Professor	Ph.D. (IIT Kanpur)	Mathematics	Member	
309	Pant Prita	Associate Professor	Ph.D. (Cornell Univ.)	Met.Engg. & Mat.Sc.	No	
310	Pant R.S.	Associate Professor	Ph.D. (U.K.)	Aerospace Engg.	No	
311	Panwar Ajay S.	Assistant Professor	Ph.D. (University of Minnesota)	Met.Engg. & Mat.Sc.	No	
312	Parida Smrutiranjan	Assistant Professor	Ph.D. (University of Saarlandes, Germany)	Met.Engg. & Mat.Sc.	No	
313	Parmananda Punit	Associate Professor	Ph.D. (Ohio University)	Physics	No	
314	Parthasarathy D.	Professor	Ph.D. (Univ.of Hyderabad)	H&SS	Member	
315	Patankar Swati	Associate Professor	Ph.D. (Tufts Univ. Boston)	Bio-Sciences & Bio-Engineering	Co-opted Member	
316	Patel Suresh C.	Professor	Ph.D. (Univ of Wyoming)	Earth Sciences	Member	
317	Patil Mahesh B.	Professor	Ph.D. (Univ.of IlliNois)	Electrical Engg.	Member	
318	Patil Rahul J.	Assistant Professor	Ph.D. (University of Colorado)	SJMSOM	No	
319	Patkar Sachin B.	Professor	Ph.D. (IIT Bombay)	Electrical Engg.	Member	
320	Pattanaik Sarmistha	Assistant Professor	Ph.D. (Jawaharlal Nehru University)	H&SS	No	
321	Patwardhan Anand P.	Professor	Ph.D. (Carnegie Mellon Univ.)	SJMSOM	Member	
322	Patwardhan S.C.	Professor	Ph.D. (IIT Bombay)	Chemical Engg.	Member	HOD, Chemical Engg. Dept.
323	Patwari Naresh Ganpathi	Associate Professor	Ph.D. (IIT Bombay)	Chemistry	No	
324	Pawaskar Dnyanesh N.	Assistant Professor	Ph.D. (Brown Univ., Providence USA)	Mechanical Engg.	No	
325	Phale Prashant S.	Professor	Ph.D. (IISc., Bangalore)	Bio-Sciences & Bio-Engineering	Member	
326	Phani Tetali	Associate Professor	M.Des.(IIT Bombay)	I.D.C.	No	
327	Phatak D.B.	Professor	Ph.D. (IIT Bombay)	CS & E	Yes	
328	Pillai Harish K	Professor	Ph.D. (IIT Bombay)	Electrical Engg.	Member	
329	Pillai Sibi Raj B.	Assistant Professor	Ph.D. (Ecole Polytechnic Federale De Lausanne)	Electrical Engg.	No	
330	Poopathi K.P.K.	Professor	Ph.D. (IIT Kanpur)	Mechanical Engg.	Member	
331	Poovaiah B.A. Ravi	Professor	DIIT (IIT Bombay)	I.D.C.	Member	
332	Prabhu Nityananda	Professor	Ph.D. (University of Canegie)	Met.Engg. & Mat.Sc.	Member	
333	Prabhu S.V.	Associate Professor	Ph.D. (IIT Bombay)	Mechanical Engg.	No	
334	Pradeep A.M.	Associate Professor	Ph.D. (IIT Kanpur)	Aerospace Engg.	No	
335	Prakash Om	Professor	Ph.D. (IIT Bombay)	Met.Engg. & Mat.Sc.	Member	
336	Prasad R.C.	Professor	Ph.D. (IISc., Bangalore)	Met.Engg. & Mat.Sc.	Member	
337	Prasad Shiva	Professor	Ph.D. (Delhi)	Physics	Member	

Sr. No.	Name	Designation	Qualification	Deptt.	Senate	Remarks
338	Prasanna T.R.S.	Assistant Professor	Ph.D. (MIT, Cambridge)	Met.Engg. & Mat.Sc.	No	
339	Punekar N.S.	Professor	Ph.D. (IISc., Bangalore)	Bio-Sciences & Bio-Engineering	Member	HOD, BSBE Dept.
340	Puranik Bhalchandra	Assistant Professor	Ph.D. (University of Wisconsin Madison)	Mechanical Engg.	No	
341	Puthenpurakal Tony J.	Associate Professor	Ph.D. (University of Purdue)	Mathematics	No	
342	Radhakrishna M. No	Associate Professor	Ph.D. (Indian School of Mines, Dhanbad)		Earth Sciences	
343	Raghunathan Ravi	Assistant Professor	Ph.D. (University of Yale)	Mathematics	No	
344	Raja S.V.	Professor	Ph.D. (IISc., Bangalore)	Met.Engg. & Mat.Sc.	Member	
345	Raje Deepashree	Assistant Professor	Ph.D. (IISc., Bangalore)	Civil Engg.	No	
346	Ramachandran K.	Professor	D.I.I.T (Industrial Design)	I.D.C.	Member	
347	Ramachandran Prabhu	Assistant Professor	Ph.D. (IIT Madras)	Aerospace Engg.	No	
348	Ramadevi Pichai	Associate Professor	Ph.D. (University of Madras)	Physics	No	
349	Ramakrishnan D.	Associate Professor	Ph.D. (M.S. University, Baroda)	Earth Sciences	No	
350	Ramakrishnan Ganesh	Assistant Professor	Ph.D. (IIT Bombay)	CS & E	No	
351	Ramamritham K.S.	Professor	Ph.D. (University of Utah)	CS & E	Member	
352	Raman Bhaskaran	Associate Professor	Ph.D. (University Of California at Berkeley)	CS & E	No	
353	Raman Preeti	Assistant Professor	Ph.D. (TIFR)	Mathematics	No	
354	Ramanathan A.	Professor	Ph.D. (IIT Bombay)	H&SS	Member	
355	Ramasubramanian K.	Associate Professor	Ph.D. (University of Madras)	H&SS	No	
356	Ramaswamy Murugavel	Professor	Ph.D. (IISc., Bangalore)	Chemistry	Member	HOD, Chemistry Dept.
357	Rana Indra K.	Professor	Ph.D. (University of Calcutta)	Mathematics	Member	
358	Ranade Abhiram G.	Professor	Ph.D. (University of Yale)	CS & E	Member	
359	Ranade Shilpa	Associate Professor	M.Des. (IIT Bombay)	I.D.C.	No	
360	Rane Milind V.	Professor	Ph.D. (University of Maryland)	Mechanical Engg.	Member	
361	Rane Mandar	Assistant Professor	M.Des. (IIT Bombay)	I.D.C.	No	
362	Rangaraj Narayan	Professor	Ph.D. (John Hopkins Univ.)	I.E. & O.R.	Member	
363	Ranjan Akhil	Professor	Ph.D. (University of Bombay)	Mathematics	Member	
364	Ranjith Padinhateeri	Assistant Professor	Ph.D. (IIT Madras)	Bio-Science & Bio-Engineering	No	
365	Rao Govardhana V.	Professor	Ph.D. (IIT Madras)	Chemical Engg.	Member	
366	Rao Mallikarjuna K.S.	Assistant Professor	Ph.D. (IISc., Bangalore)	I.E. & O.R.	No	
367	Rao Anand B	Assistant Professor	Ph.D. (C.M. University, Pittsburgh)	CTARA	No	
368	Rao C. Pulla	Professor	Ph.D. (IISc., Bangalore)	Chemistry	Member	
369	Rao Emmela P.	Associate Professor	Ph.D. (IIT Bombay)	Civil Engg.	No	
370	Rao K. Krishnamurthy	Professor	Ph.D. (University of Bombay)	Bio-Sciences & Bio-Engineering	Member	
371	Rao K.V.K.	Professor	Ph.D. (IIT Madras)	Civil Engg.	Member	HOD, Civil Engg. Dept.

Sr. No.	Name	Designation	Qualification	Deptt.	Senate	Remarks
372	Rao Kumar	Assistant Professor	Ph.D. (Univ. of Connecticut Ctorrs, CT)	Physics	No	
373	Rao Nageshwara S. V. D.	Associate Professor	Fellow of IIM Ahmedabad	SJMSOM	No	
374	Rao Preeti S.	Professor	Ph.D. (University of Florida)	Electrical Engg.	Member	
375	Rao Ramgopal V.	Professor	Ph.D. (University of Germany)	Electrical Engg.	Member	
376	Rao Sapar Narayan	Associate Professor	Ph.D. (IIT Madras), Dip.in Business Finance (ICFAI)	SJMSOM	No	
377	Rao Sumant M.	Associate Professor	M.Des. (IIT Bombay)	I.D.C.	No	
378	Rao Y.S.	Associate Professor	Ph.D. (IIT Bombay)	CSRE	No	
379	Rastogi A. Kumar	Professor	Ph.D. (University of Birmingham)	Civil Engg.	Member	
380	Ravi Bhallamudi	Professor	Ph.D. (IISc., Bangalore)	Mechanical Engg.	Member	
381	Ravikanth M.	Professor	Ph.D. (IIT Kanpur)	Chemistry	Member	
382	Ray Gaur G.	Professor	Ph.D. (University of Calcutta)	I.D.C	Member	HOD, IDC
383	Reddy Manne Janga	Assistant Professor	Ph.D. (IISc., Bangalore)	Civil Engg	No	
384	Robinson Rowena	Professor	Ph.D. (University of Cambridge)	H&SS	Member	
385	Roy Bhaskar	Professor	Ph.D. (IIT Kharagpur)	Aerospace Engg.	Member	
386	Roy Sandip	Associate Professor	M.S. (SUNY, Buffalo)	Chemical Engg.	No	
387	S. Maheswaran	Assistant Professor	Ph.D. (University of Manches)	Chemistry	No	
388	Sabnani Nina	Associate Professor	M.A. (Syracuse Univ, Newyork, USA)	I.D.C.	No	
389	Sabnis Sanjeev V.	Associate Professor	Ph.D. (University of Madras)	Mathematics	No	
390	Sadhu Nachiketa	Assistant Professor	M.Sc. (University of Calcutta)	I.D.C.	No	
391	Saha Dipankar	Assistant Professor	Ph.D. (University of Maxican)	Electrical Engg.	No	
392	Sahoo Anirudha	Associate Professor	Ph.D. (Texas A&M Univ.)	CS & E	No	
393	Sain Anirban	Associate Professor	Ph.D. (IISc. Bangalore)	Physics	No	
394	Samajdar Indradev	Professor	Ph.D. (University of Drexel)	Met.Engg. & Mat.Sc.	Member	
395	Sandesh M. Ramu	Assistant Professor	M.Des. (IIT Bombay)	I.D.C.	No	
396	Santanu Dey	Assistant Professor	Ph.D. (Indian Statistical Institute)	Mathematics	No	
397	Sanyal Amitabha	Professor	Ph.D. (IIT Kanpur)	CS & E	Member	HOD, Comp. Sc. & Engg. Dept.
398	Saraph Girish P.	Associate Professor	Ph.D. (University of Maryland)	Electrical Engg.	No	
399	Saraswati Pratul K.	Professor	Ph.D. (IIT Bombay)	Earth Sciences	Member	
400	Sarawagi Sunita	Associate Professor	Ph.D. (University of California)	CS & E	No	
401	Sarda N.L.	Professor	Ph.D. (IIT Bombay)	CS & E	Member	
402	Sarin Pradeep	Assistant Professor	Ph.D. (Massachusetts Instt. of Tech.)	Physics	No	
403	Sarkar Shaibal K.	Assistant Professor	Ph.D. (Weizmann Instiute of Science)	Energy Science & Engg.	No	
404	Sarma Vaijayanthi Mala	Associate Professor	Ph.D. (Massachussetts Instt. of Tech.)	H&SS	No	
405	Sasidhar Y.U.	Professor	Ph.D. (IIT Madras)	Chemistry	Member	
406	Sebastian C.D.	Associate Professor	Ph.D. (Banaras Hindu Univ.)	H&SS	No	

Sr. No.	Name	Designation	Qualification	Deptt.	Senate	Remarks
407	Sen Shamik R.	Assistant Professor	Ph.D. (University of Philadilphia)	Bio-Sciences & Bio-Engineering	No	
408	Senthil Kumar M.	Professor	Ph.D. (IIT Madras)	Physics	Member	
409	Seshu Pasumarthy S	Professor	Ph.D. (IIT Madras)	Mechanical Engg.	Member	
410	Sethi Virendra	Professor	Ph.D. (University of Wisconsin, Madison)	CESE	Member	HOD, CESE
411	Shah Narendra G	Associate Professor	Ph.D. (ATU France)	CTARA	No	
412	Shankar Hariharan S.	Professor	Ph.D. (University of Monash)	Chemical Engg.	Member	
413	Sharma Dinesh	Assistant Professor	MBA (University of Jammu)	SJMSOM	No	
414	Sharma Atul	Associate Professor	Ph.D. (IIT Kanpur)	Mechanical Engg.	No	
415	Sharma Dinesh K.	Professor	Ph.D. (Bombay Univ.)	Electrical Engg.	Member	
416	Sharma Nishant	Assistant Professor	Ph.D. (enrolled with IIT Guwahati)	I.D.C.	No	
417	Sharma Pratibha	Assistant Professor	Ph.D. (University of Rajastan)	Energy Science & Engg.	No	
418	Sharma S.D.	Professor	Ph.D. (IIT Bombay)	Aerospace Engg.	Member	HOD, Aero. Engg. Dept.
419	Sharma Vishnu D.	Professor	Ph.D. (BHU)	Mathematics	Member	
420	Shastri Anant R.	Professor	Ph.D. (University of Bombay)	Mathematics	Member	
421	Shastri Sudha	Associate Professor	Ph.D. (IIT Delhi)	H&SS	No	
422	Sheth Hetu C.	Associate Professor	Ph.D. (IIT Bombay)	Earth Sciences	Co-opted Member	
423	Shevare G.R.	Professor	Ph.D. (IIT Bombay)	Aerospace Engg.	Member	
424	Shevgaonkar R.K.	Professor	Ph.D. (IIT Bombay)	Electrical Engg.	Member	
425	Shukla Alok	Professor	Ph.D. (Utah State University	Physics	Member	
426	Shukla Anshuman	Assistant Professor	Ph.D. IIT Kanpur	Electrical Engg.	No	
427	Singh Ramesh Kumar	Assistant Professor	Ph.D. (Georgia Institute of Technology)	Mechanical Engg.	No	
428	Singh A.K.	Professor	Ph.D. (IIT Kanpur)	Chemistry	Member	
429	Singh B.P.	Professor	Ph.D. (IIT Kanpur)	Physics	Member	
430	Singh D.N.	Professor	Ph.D. (IIT Kanpur)	Civil Engg	Member	
431	Singh H.B.	Professor	Ph.D. (University of Aston)	Chemistry	Member	
432	Singh Prabhakar P.	Professor	Ph.D. (University of North Carolina) USA	Physics	Member	HOD, Physics Dept.
433	Singh Suneet	Assistant Professor	Ph.D. (University of IlliNois)	Energy Science & Engg.	No	
434	Singh Triok Nath	Professor	Ph.D. (BHU)	Earth Sciences	Member	
435	Singh Virendra	Associate Professor	Ph.D. (NARA Institute of Science)	Electrical Engg.	No	
436	Singh Vishwakarma H.	Professor	Ph.D. (University of Gorakhpur)	Chemistry	Member	
437	Sinha Arpita	Assistant Professor	Ph.D. (IISc. Bangalore)	Systems & Control Engg.	No	
438	Sinha Krishnendu	Associate Professor	Ph.D. (University of Minnesota)	Aerospace Engg.	No	
439	Sinha Pooja Purang	Associate Professor	Ph.D. (IIT Delhi)	H&SS	No	
440	Sinha Ravi	Professor	Ph.D. (North Western Univ.)	Civil Engg.	Member	Prof.-in-Charge (Placement Office)

Sr. No.	Name	Designation	Qualification	Deptt.	Senate	Remarks
441	Sirola Vikram Singh	Associate Professor	Ph.D. (JNU)	H&SS	No	
442	Sista Sivaji G.	Assistant Professor	Ph.D. (Indian Institute of Science)	Mathematics	No	
443	Sivakumar G.	Professor	Ph.D. (University of Illinois)	CS & E	Member	HOD, CFDVS
444	Sivasubramanian K.	Assistant Professor	Ph.D. (TIFR)	Mathematics	No	
445	Sohoni Milind Ashok	Professor	Ph.D. (IIT Bombay)	CS & E	Member	
446	Solanki Chetan Singh	Associate Professor	Ph.D. (Katholieke Universiteit, Leuven)	Energy Science & Engg.	No	
447	Soman S.A.	Professor	Ph.D. (IISc., Bangalore)	Electrical Engg.	Member	
448	Sonar Rajendra M.	Associate Professor	Ph.D.(University of Pune)	SJMSOM	No	
449	Sreedhara Sheshadri	Associate Professor	Ph.D. (Indian Institute of Science, Bangalore)	Mechanical Engg.	No	
450	Sreekumar G.V.	Associate Professor	M.Des. (IIT Bombay)	I.D.C.	No	
451	Sreekumar Sharmila	Associate Professor	Ph.D. (Central Univ. of Hyderabad)	H&SS	No	
452	Sridharan Arun Kumar	Assistant Professor	Ph.D. (The Pennsylvania State Univ)	Mechanical Engg.	No	
453	Srikant Sukumar	Assistant Professor (Contractual Basis)	Ph.D. (University of Texas of Austin)	Systems & Control Engg.	No	
454	Srinivasa Raman S.	Professor	Ph.D. (University of Toledo)	Met.Engg. & Mat.Sc.	Member	
455	Srinivasan G.K.	Associate Professor	Ph.D. (University of Minnesota)	Mathematics	No	
456	Srinivasan Murali K.	Professor	Ph.D. (University of Illinois)	Mathematics	Member	HOD, Mathematics Dept.
457	Srirangarajan H.R.	Professor	Ph.D. (IISc., Bangalore)	Mechanical Engg.	Member	
458	Srivastava Rohit	Associate Professor	Ph.D. (Louisiana Tech.Univ., Ruston, USA)	Bio-Sciences & Bio-Engineering	No	
459	Srivastava Sanjeeva	Assistant Professor	Ph.D. (University of Alberta)	Bio-Sciences & Bio-Engineering	No	
460	Srividya A.	Professor	Ph.D. (IIT Bombay)	Civil Engg.	Member	
461	Subhash A. Babu	Professor	Ph.D. (IIT Delhi)	Mechanical Engg.	Member	
462	Subrahmanyam G.	Professor	Ph.D. (Ind. Agri. Res. Inst., Delhi)	Bio-Sciences & Bio-Engineering	Member	
463	Subramanyam A.	Professor	Ph.D. (University of Poona)	Mathematics	Member	
464	Subuddhi M. K.	Associate Professor	M.A. (Calcutta), M.A. (J.N.U.)	H&SS	No	
465	Sudarshan S.	Professor	Ph.D. (University of Wisconsin)	CS & E	Member	
466	Sudhakar K.	Professor	Ph.D. (IIT Bombay)	Aerospace Engg.	Member	
467	Sule Virendra	Professor	Ph.D. (IIT Bombay)	Electrical Engg.	Member	
468	Sunoj Raghavan	Associate Professor	Ph.D. (IISc., Bangalore)	Chemistry	No	
469	Sunthar P.	Assistant Professor	Ph.D. (IISc., Bangalore)	Chemical Engg.	No	
470	Suresh A. K.	Professor	Ph.D. (University of Monash)	Chemical Engg.	Member	
471	Suresh G. K.	Professor	Ph.D. (IIT Madras)	Physics	Member	
472	Suresh Kumar K.	Associate Professor	Ph.D. (IISc., Bangalore)	Mathematics	No	
473	Suresh Sumathi	Professor	Ph.D. (IISc., Bangalore)	CESE	Member	
474	Suryanarayanan Shashikanth	Associate Professor	Ph.D. (University of California)	Mechanical Engg.	No	

Sr. No.	Name	Designation	Qualification	Deptt.	Senate	Remarks
475	Talwar Neelima	Professor	Ph.D. (University of Baroda)	H&SS	Member	
476	Tathagat A. Tulsi	Assistant Professor (Contractual Basis)	Ph.D. (IISc., Bangalore)	Physics	No	
477	Tayalia Prakriti	Assistant Professor (Contractual Basis)	Ph.D. (Harvard University)	Bio-Sciences & Bio-Engineering	No	
478	Tembe Bhalachandra L.	Professor	Ph.D. (SUNY, USA)	Chemistry	Member	
479	Tewari Asim	Associate Professor	Ph.D. (Georgia Institute of Technology, Atlanta, USA)	Mechanical Engg.	No	
480	Thaokar Rochish	Associate Professor	PhD. (IISc., Bangalore)	Chemical Engg.	No	
481	Tirumkudulu Mahesh S.	Associate Professor	Ph.D. (City Univ. of New York, USA)	Chemical Engg.	No	
482	Tomy C.V.	Professor	Ph.D. (TIFR, Mumbai)	Physics	Member	
483	Trivedi K. Kirti	Professor	P.G.D. (IIT Bombay)	I.D.C	Member	
484	Trivedi Pushpa L.	Professor	Ph.D. (IIT Bombay)	H&SS	Member	
485	Tulapurkar Ashwin	Associate Professor	Ph.D. (Tata Institute of Fundamental Research)	Electrical Engg.	No	
486	Umasankar S.	Professor	Ph.D. (IIT Kanpur)	Physics	Member	
487	Varma Raghava	Professor	Ph.D. (IIT Kanpur)	Physics	Member	
488	Vasa Parinda	Assistant Professor	Ph.D. (TIFR)	Physics	No	
489	Vasi Juzer M.	Professor	Ph.D. (University of John Hopkins)	Electrical Engg.	Member	
490	Vedula Rajendra P.	Professor	Ph.D. (University of Arizona)	Mechanical Engg.	Member	HOD, Mechanical Engineering Dept.
491	Vellaisamy P.	Professor	Ph.D. (IIT Kanpur)	Mathematics	Member	
492	Velmurugan Rajbabu	Assistant Professor	Ph.D. (Gerorgia Institute of Tech., USA)	Electrical Engg.	No	
493	Venkatachalam Parvatham	Professor	Ph.D. (University of Cambridge)	CSRE	Member	HOD, CSRE
494	Venkataraman Chandra	Professor	Ph.D. (University of California)	Chemical Engg.	Member	
495	Venkataraman G.	Associate Professor	Ph.D. (IIT Bombay)	CSRE	No	
496	Venkataramani N.	Professor	Ph.D. (IIT Bombay)	Met.Engg. & Mat.Sc.	Member	
497	Venkatesh K.V.	Professor	Ph.D. (University of Purdue)	Chemical Engg.	Member	
498	Venkateswaran Jayendran	Assistant Professor	Ph.D. (University of Arizona)	I.E. & O.R.	No	
499	Verma A.K.	Professor	Ph.D. (IIT Kharagpur)	Electrical Engg.	Member	
500	Verma J.K.	Professor	Ph.D. (University of Purdue)	Mathematics	Member	
501	Vijaya R.	Professor	Ph.D. (IIT Madras)	Physics	Member	
502	Vijayakumaran Saravanan	Assistant Professor	Ph.D. (University of Florida)	Electrical Engg.	No	
503	Vinjamur Madhu	Associate Professor	Ph.D. (University of Drexel)	Chemical Engg.	No	
504	Viswanadham B.V.S.	Professor	Dr.Ing. (University of Ruhr)	Civil Engg.	Member	
505	Viswanathan Ganesh A	Assistant Professor	Ph.D. (University of Houston)	Chemical Engg.	No	
506	Viswanathan N.N.	Associate Professor	Ph.D. (IISc., Bangalore)	Met.Engg. & Mat.Sc.	No	
507	Viswanathan S.	Professor	Ph.D. (University of Chicago)	CS & E	Member	
508	Vitta Satish	Professor	Ph.D. (University of Cambridge)	Met.Engg. & Mat.Sc.	Member	
509	Wangikar Pramod P.	Professor	Ph.D. (University of Iowa)	Chemical Engg.	Member	
510	Yajnik U.A.	Professor	Ph.D. (University of Texas)	Physics	Member	

Sr. No.	Name	Position	Qualification	Department
Group 'A' Officers				
1	Adagale D.B.	Assistant Registrar	B.A., L.L.B., M. A. (History)	Audit Section
2	Ainapure S.V.	Medical Officer (SG)	M.D. (Bombay)	IIT Hospital
3	Appaji B.B.	Senior Sports Officer	Ph.D. (Gwalior)	Student Gymkhana
4	Bajre Kamal Kumar	Deputy Registrar	MPM (Pune University)	Administration Section
5	Bhagwat A. S.	Principal	Diploma in Higher Education, M. Sc	Campus School & Jr. College
6	Bhaldar I.H.	Asst.Workshop Supdt. (SG)	B.E. (Kolhapur University)	Mechanical Engg.
7	Bhendigiri Omprakash B.	Assistant Librarian	M.Lib.Sc.(Karnatak University)	Central Library
8	Bhorkade G.K.	Dy. Registrar	M.Sc. (Mangalore Univ.), Dip in Comp.Sc. (Amravati Univ.), Maha.State, Certi. in IT (MKCL)	MMD
9	Chaurasia Dharmendra S	Senior Programmer	B.E. Electronics (Mumbai University)	ASC
10	Chilap Gopal R.	Manager	B.Com. (Mumbai University) Diploma in Printing Technology & Graphics Arts	Printing Press
11	Dabholkar Nayan S.	Manager, Guest House	B.A., Dip. in Hotel Management & Catering and Dip. in Business Management., M.A. (Madurai Kamraj Univ.), MBA (Madurai Kamraj University)	Guest House
12	Dhankar Rajesh	Security Officer	B.A. (Rajasthan Univ.), Dip. in Computer Science & Application (NIT & M), Ministry of Defence	Security Section
13	Edwin M.	Sports Officer (SG)	Ph.D. (Gwalior)	Student Gymkhana
14	Jena A.K.	Chief Technology Officer	M.E. (IISc., Bangalore)	Computer Centre
15	Jha S.N.	Senior Sports Officer	Ph.D. (Gwalior)	Student Gymkhana
16	Joglekar C.P.	Co-ordinator,	B.A.(Pune Univ.), MPM - Pune University	P.T. & D Cell
17	Joshi Jaya	Public Relations Officer	PGDBM (IIPM, Delhi)	Publications & Public Relations Section
18	Jotwani Daulat	Librarian	B.Sc., M.Lib.Sc., M.A. Cert. French (Univ. of Rajasthan)	Central Library
19	Kale Sheetal N.	Medical Officer	M.B.B.S. (Nagpur University)	IIT Hospital
20	Khobragade Y.S.	Medical Officer (SG)	M.D. (Delhi)	IIT Hospital
21	Korade Umesh R.	Assistant Registrar	B.Sc. (Shivaji Univ.), M.B.A. (Shivaji University)	Academic Section
22	Kowe Vijay G.	Assistant Registrar	MBA (Nagpur University)	Academic Section
23	Kulkarni S.D.	Deputy Librarian	M.Lib.Sc.	Central Library
24	Maharana Jyoti Prasad	Systems Manager	Ph.D. (IIT Bombay)	Computer Centre
25	Mamdapur V.B.	Supdt. Engineer	B.E. (Pune) and M.Tech. (IIT Bombay)	Estate Office

Sr. No.	Name	Position	Qualification	Department
26	Marathe Madhukar S.	Assistant Registrar	MA (Pune University)	Administration Section
27	Mehta Sunil Kumar	Assistant Training & Placement Officer	B.E. in Mech. Engg. (Gulbarga University)	Placement Office
28	Meshram Arvind	Medical Officer	M.B.B.S. (Delhi), M.Phil. (BITS, Pilani)	IIT Hospital
29	Nagwekar Ashish M.	Computer Engineer	B.E. (Mumbai University)	Computer Centre
30	Pathak S.K.	Lab. Superintendent	M.Tech. (IIT Bombay), Ph.D. (IIT Bombay)	Mechanical Engg.
31	Patil Arvind S.	Technical Officer	M.Tech. (IIT Kharagpur)	C-DEEP
32	Patil S.G.	Sr. Medical Officer	MBBS (Mumbai)	IIT Hospital
33	Patki Savita V.	Assistant Registrar	B.A. (Bombay University)	Accounts Section
34	Punalkar B.S.	Registrar	M.A. (Shivaji University)	Registrar Office
35	Rajan Prema A.	Assistant Registrar	M.Com. (Calicut University)	Accounts Section
36	Ramesh P.G.	Dy. Registrar	M.Phil. in Public Administration (Madurai Kamaraj University)	Accounts Section
37	Rao M.N.R.	Manager (Telecommunication)	Dip. In Electrical Engg.	Telecommunication
38	Reddy P.M.	Sports Officer (SG)	Ph.D. (Gwalior)	Student Gymkhana
39	Ringnekar Nila D.	Sr. Medical Officer	MBBS (North Maharashtra Univ., Jalgaon)	IIT Hospital
40	Romani Indrajit A.	Assistant Registrar	M.Com. (Mumbai University)	Accounts Section
41	Sahoo Biswakesan	Executive Engineer (Elect)	M.E. Burla/Sambalpur Univ.	Electrical Maintenance
42	Sawalkar D. K.	Assistant Registrar	MBA (Marathwada University)	Estate Office
43	Saxena Indu	Deputy Registrar	Ph.D. (Jamnalal Bajaj Institute)	Administration Section
44	Sengupta K.	Sports Officer (SG)	Ph.D. (Gwalior)	Student Gymkhana
45	Shah Nisha	Incharge (Hospital), CMO (NFSG)	MBBS (Nagpur), MD (Pde)(Nagpur)	IIT Hospital
46	Shetye Asmita S.	Project Manager	B.E. Electronics (Mumbai University)	ASC (Application Software Cell)
47	Siriah Pankaj	Computer Engineer(SG)	M.Tech. (IIT Bombay)	Computer Sc. & Engineering
48	Solanki Manohar R.	Senior Programmer	M.Sc. (Mumbai University)	ASC
49	Sonawane Yogesh	Asstt. Workshop Supdt.		Mechanical Engg.
50	Tagare Amita	Counsellor	M.A. (Pune University)	Dean's Office
51	Tirmare P.V.	Computer Engineer	B.E. Computer Engg. (Shivaji University), M. Tech (Dr. Babasaheb Ambedkar Technological Univ.)	Computer Centre
52	Unnithan K.R.P	Executive Engineer	B.E. Civil Engineering (Mumbai University)	Estate Office
53	Verma Hari Shankar	Assistant Registrar	M.A. (Kanpur Univesity), LLB. (Professional)	Academic Section

Sr. No.	Name	Position	Qualification	Department
54	Verma Narsingh	Executive Engineer	M.Tech. in Civil Engg. (IIT Bombay)	Estate Office
55	Vichare Sunil Y.	Computer Engineer	B.E. (Pune University)	Computer Centre
56	Vinjamur Sugandhi	Senior Programmer	MCA (Osmania University)	ASC
57	Waydande H.S.	Deputy Librarian	Ph.D. (Pune University)	Central Library
58	Yadav S.S.	Senior Sports Officer	Ph.D. (Gwalior)	Student Gymkhana

Scientific/Design Staff

1	Aiyar R.P.R.C.	Prin. Res. Scientist	Ph.D. (IIT Bombay)	CRNTS
2	Gandhi Mayuri	Research Scientist	Ph.D. (IIT Bombay)	CRNTS
3	Kalwankar Arun	Producer-cum-Designer	Dip. In Fine Arts (Drg.&Ptg.)	C-DEEP
4	Mombasawala L. S.	Sr. Research Engineer	M.Tech. (IIT Bombay)	CRNTS
5	Mukherji Shyamalee	Sr. Research Engineer	Ph.D. (IIT Bombay)	CSRE
6	Vijayalakshmi S.	Research Scientist	Ph.D. (IIT Bombay)	CRNTS

INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
BALANCE SHEET AS AT 31.03.2012
CONSOLIDATED MAIN ACCOUNT

(Amount in Rs.)

Sr No.		Liabilities		Current Year 2011-12	Previous Year 2010-11
1)		*Capital Fund*			
	a)	Grant Utilised for Capital Expenditure		6,344,346,225	5,127,817,789
	b)	Project & Consultancy		1,477,669,482	1,163,062,345
			A	7,822,015,707	6,290,880,134
	b)	*Income and Expenditure*			
		Opening Balance		198,447,714	197,697,400
		Less: Amt. Transferred to Endowment Fund		750,314	
		Add : Excess of Income over Expenditure		4,076,177	750,314
			B	201,773,577	198,447,714
		Total of A+B		8,023,789,284	6,489,327,848
2)		Unutilised grants from other organisations		254,829,837	183,239,072
3)		Grant Utilised for Capital Expenditure (Advances)		677,421,064	0
4)		*Other adjustable Accounts*			
		i) Staff/Student Funds		62,110,133	50,081,640
		ii) Other Adjustable Account		30,557,723	453,173,724
5)		IRCC Fund		1,158,578,570	1,026,976,868
6)		Institute Development Fund (Donation)		293,489,981	248,076,933
7)		Endowment Fund (Donation)		704,132,535	627,870,537
8)		Interest in Endowment Fund (Donation)		256,173,599	217,742,666
9)		Non Endowment Fund (Donation)		460,494,339	463,304,474
10)		Institute Internal Project Account		5,251,013	0
11)		Adjustable/Transferable Amount to Project		22,228,183	0
12)		Project & Consultancy			
		i) Other Funds		306,538,525	259,143,121
		ii) Other Adjustable Account		886,981	909,428
13)		Adjustable Accounts – Unutilised Amounts (P&C)		1,954,646,350	1,556,886,114
14)		Refundable Deposits		154,643,160	156,000,912
15)		Endowment of Scholarships		646,787	646,787
16)		Sundry Creditors		409,825,378	313,639,810
17)		Prepaid Income		1,371,778	1,031,849
		Grand Total :		**14,777,615,221**	**12,048,051,784**

(Amount in Rs.)

Sr No.		Assets		Current Year 2011-12	Previous Year 2010-11
		Fixed Assets			
1)		Land		2,663,875	2,663,875
2)		*Buildings*			
	a)	Works completed		820,959,277	783,681,314
	b)	Works in progress		3,507,826,345	2,342,349,685
3)		Equipment and Tools/Academic Deptt. & Centres		789,513,108	903,478,262
4)		Computers		58,847,073	0
5)		Equipment and Tools/ Other Sections		1,494,738,206	1,222,874,404
6)		Augmentations of Labs/ Workshops		7,234,844	8,177,681
7)		Equipment & Fur./Girish Gaitonde Donations		2,382,178	2,977,722
8)		Motor Vehicles		713,653	892,066
9)		Library Books received as Donations		554,943	554,943
10)		Furniture and Fixtures		79,509,349	62,917,802
11)		Library Books and Journals		1,052,110,689	954,615,453
12)		Kanwal Rekhi School of Inform. Technology		410,382	512,978
13)		ACRE Project Assets		1,738,166	2,172,707
14)		Equipment & Tools/Special grant from MHRD		784,363	980,450
15)		Library Books & Journals/Special grant from MHRD		2,026,953	2,026,954
16)		Advances Account		905,865,540	545,404,670
17)		Recoverable Deposits		36,049,252	36,352,821
18)		Fixed Deposits		5,000,194,482	3,773,702,185
19)		Expenditure Recoverable		66,613,237	72,167,004
20)		Closing stock - Consumables and other stock		11,448,745	9,395,289
21)		Guest House bills receivable		0	974,549
22)		Sundry Debtors		99,481,172	153,560,711
23)		Computer System - DST (IRCC Donation)		2,303	3,839
24)		Grant in Aid Sanctioned but not received		370,000,000	0
25)		Accrued Interest		186,859,463	209,513,537
26)		Adjustable Accounts – Overspent Amounts (P&C)		56,361,557	94,773,142
27)		Closing Balance - Cash In Hand and at Bank		222,726,066	861,327,739
		Grand Total :		**14,777,615,221**	**12,048,051,784**

INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31.03.2012
CONSOLIDATED MAIN ACCOUNT

(Amount in Rupees)

SR. NO.		PARTICULARS	Current Year Up to 31.03.2012	Previous Year Up to 31.03.2011
		INCOME		
1		Grant-in-aid from Govt. of India		
	a)	*Non-Plan*		
		Grant-in - aid released during the year	1,930,000,000	1,896,500,000
		Sanctioned in 2011-12 and due	90,000,000	0
			2,020,000,000	1,896,500,000
		Less: Shortfall in 2009-2010 adjusted	0	20,833,236
			2,020,000,000	1,875,666,764
	b)	*Plan*		
		Grant-in-aid released during the year	2,200,000,000	1,432,200,000
		Less: Shortfall in 2009-2010 adjusted	0	20,361,842
		Add : Sanctioned in 2011-12 and due	280,000,000	0
			2,480,000,000	1,411,838,158
		Less : Amount utilised for capital expenditures (Advance)	677,421,064	0
		Less:- Amount utilised for capital expenditures	1,487,588,586	1,083,809,265
			314,990,350	328,028,893
	c)	*Plan (OSC)*		
		Grant-in-aid released during the year	0	300,000,000
		Less: Shortfall in 2009-2010 adjusted	0	28,024,342
			0	271,975,658
		Less: Amount Utilized for Capital Expenditure	0	271,975,658
			2,334,990,350	**2,203,695,657**
2	a)	Support from IRCC for Equipment and Furniture	1,824,400	6,500,000
	b)	Add: Support from IRCC for Capital Expenditure	5,275,750	4,472,647
	c)	Add: Donation Receipts towards Capital Expenditure	0	5,315
		Less:- Capital Expenditure against from other Sources	7,100,150	10,977,962
			0	0
3		Support for Recurring Expenses from IRCC	450,000	0
4		Fees from students	231,930,069	182,382,403
5		Other receipts from students	24,846,181	58,918,965
6		All India Entrance Examination Receipts	106,397,738	110,802,180
7		Other Income and Miscellaneous Receipts	199,124,225	190,795,083
8		Interest on CPF/GPF Investment	78,851,410	71,752,838
9		Interest on Short Term Deposit	30,644,456	4,335,882
10		Guest House Receipts	8,473,993	9,220,885
11		Leave Salary Received	0	2,548,410
12		Receipts from Continuing Education Prog.	5,701,812	3,419,736
13		Non Payable Institute Contribution	200,108	267,638
14		Donation Received	417,973	1,493,800
15		Interest on STD Donation	126,432,872	108,035,537
16		Interest on Investments (P&C)	224,130,255	174,344,621
		Grand Total	**3,372,591,442**	**3,122,013,635**

(Amount in Rupees)

SR. NO.		PARTICULARS	Current Year Up to 31.03.2012	Previous Year Up to 31.03.2011
		EXPENDITURE		
1		**Pay and Allowances**		
	i)	Faculty	638,112,471	575,608,878
	ii)	Non Faculty Officers	81,119,253	78,324,997
	iii)	Establishment	442,642,945	421,237,952
	iv)	Salary and Wages	31,043,853	25,506,430
	v)	IRCC	10,392,061	9,058,786
		6th PC Arrears		
	i)	Faculty	594,980	8,083,866
	ii)	Non Faculty Officers	36,456	239,318
	iii)	Establishment	1,849,274	11,375,932
		Sub Total (1)	1,205,791,293	1,129,436,159
2		Other Allowances	57,722,499	67,331,114
3		Retirement Benefits	530,384,741	512,293,950
		Sub Total (1 to 3)	**1,793,898,533**	**1,709,061,223**
4		***Administrative Expenses***		
	i)	General Expenses	34,687,558	34,560,856
	ii)	Other Misc. Expenses	205,206,636	155,091,659
	iii)	Other Educational Expenses	30,385,742	30,811,833
	iv)	All India Entrance Examination Expenses	69,264,854	50,472,949
		Sub Total (4)	**339,544,790**	**270,937,297**
5		***Departmental Expenses***		
	i)	Consumables/Academic Deptt. and Centres	34,308,521	33,811,869
	ii)	Other contingent expenditure / Academic Deptt. And Centres	18,795,517	14,429,814
	iii)	Maintenance and repairs to equipment	15,925,126	17,030,892
		Sub total (5)	**69,029,164**	**65,272,575**
6		Student Gymkhana Expenditure	6,897,320	8,075,216
7		Scholarship	257,655,310	232,497,389
8		Financial Assistance to Hostels (Mess Employees)	41,219,964	78,662,383
9		Health Facilities / Hospital Expenses	38,072,082	34,721,998
10		House keeping and Estate maintenance	318,030,719	277,092,743
11		Water Charges	12,236,092	10,222,739
12		Electricity Charges	226,011,317	171,497,980
13		Donation Account	25,145,822	19,689,612
14		Allocation of Interest to Endowment A/c (Donation)	54,583,230	48,040,222
15		Amount Transferred to Institute Development Fund (Donation)	47,121,793	41,799,503
16		Amount transferred to IRCC Fund	139,069,130	153,692,443
17		Excess of Income over Expenditure	4,076,177	750,314
		Grand Total	**3,372,591,442**	**3,122,013,635**

INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
RECEIPTS AND PAYMENTS FOR THE PERIOD FROM 1-4-2011 TO 31-3-2012
CONSOLIDATED MAIN ACCOUNT

(Amount in Rs.)

SR NO		RECEIPTS	CURRENT YEAR 2011-12	SR NO		PAYMENTS	CURRENT YEAR 2011-12
		Opening Balance		1		*Capital Expenditure*	
1		Cash in Hand and at Bank	861,327,739		i)	Equipments	45,432,331
2		*Grant-in-aid*			ii)	Computers	28,570,467
	i)	Non-Plan	1,930,000,000				
	ii)	Plan	2,200,000,000		iii)	Furniture & Fixtures	21,756,803
					iv)	Library Books & Journals	84,603,046
3		Fees from students	215,625,082				
					v)	Building & Works	774,420,703
4		Other receipts from students	54,767,522				
						Sub Total I	954,783,350
5		All India Entrance Examination Receipts	39,597,738				
				2		**Recurring Expenditure**	
6		Other income & Misc. receipts	98,913,273		a)	Pay & Allowances	785,255,670
7		Interest from CPF/GPF investments	65,501,303				
					b)	Other Allowances	27577334
8		Interest on Short Term Deposits	28,933,149				
					c)	Retirement Benefits	522,069,268
9		Guest House Receipts	5,565,555				
					d)	Administrative Expenses	
10		Receipts from Continuing Education Programme	5,701,812			i) General Expenses	22,511,292
						ii)Other Misc. Expenses	54,827,711
						iii) Educational Expenses	15,729,111
11		Grants from other Organisation	323,814,697			iv) All India Entrance Examinations	19,476,489
						Sub Total 2 (c)	112,544,603
12		Adjustable Accounts			e)	Internet Charges	21,209,219
	i)	Advances Account	297,431,372				
	ii)	Other accounts	156,731,814		f)	*Departmental Expenses :*	
	iii)	Refundable Deposits	91,757,969			I) Consumable/Academic Dept. and Centres	26,848,442
	iv)	Endowment of Scholarhsip	54,200				
	v)	Recoverable Deposits	1,147,459			ii) Other Contingent Expenditure/ Academic Deptt. & Centres	13,933,365
						iii) Maintenance & Repairs to Equipments	16,340,992
		Sub Total – 12	547,122,814			Sub Total 2 (g)	57,122,799
13		Sundry Debtors	20,369,068				
					g)	Students Gymkhana Expenditure	4,671,556
14		Non Payable Institue Contribution	86,490				
					h)	Scholarship	239,581,324
15		Accrued Interest	414,080				

(Amount in Rs.)

SR NO		RECEIPTS	CURRENT YEAR 2011-12	SR NO		PAYMENTS	CURRENT YEAR 2011-12
					i)	Financial Assistance to Hostels	43,524,990
16		Fixed Deposit Encashed	3,454,505,339				
					j)	Health Facilities/ Hospital Expenses	27,909,926
17		**Donation**					
	a)	Endowment	76,261,998		k)	House Keeping and EstateMaintenance	304,375,046
	b)	Non Endowment	180,266,424				
	c)	Fixed Deposit Encashed	318,443,617		l)	Water Charges	9436092
	d)	Interest received	118,143,985				
	e)	Sundry Debtors	19,196		m)	Electricity Charges	204,365,097
18		**Project & Consultancy**		3		Grant from other organisations – Exp.	229,409,112
	a)	Sponsored Project	1,676,701,292				
	b)	Consultancy Jobs	244,975,870	4		*Adjustable Accounts*	
	c)	Department Development Fund	11,810,145		i)	Advance Accounts	1,456,164,120
	d)	Research Development Fund	2,063,542		ii)	Other Adjustable Accounts	591,638,221
	e)	Testing	13,093,702		iii)	Refundable Deposits	79,268,585
	f)	Royalty	24,189,155		iv)	Endowment Scholarship	290,813
	g)	Interest on Investment	243,888,419		v)	Recoverable Deposits	1,398,840
	h)	Interest on Sine Corpus Fund	15,527,359		vi)	Fixed Deposits	3,724,947,679
	i)	Investment matured during the year	4,507,188,009			Total 4	5,853,708,258
	j)	Refund from SINE	22,049,901				
	k)	Other receipts from students	34,913,285	5		Sundry Creditors	122,117,844
	l)	Other Adjustable Account	1,268,071,409				
				6		**Donation**	
					a)	Non Endowment	71,176,674
					b)	Fixed Deposits Invested	499,000,000
					c)	Expenses out of Endowment Interest	14,750,446
					d)	Expenses of Donation Account	122,645,801
					e)	Advance General	4,885,648
				7		**Project & Consultancy**	
					a)	Sponsosred Project	860,654,879
					b)	Consultancy Jobs	190,844,962
					c)	Department Development Fund	17,176,296
					d)	Research Development Fund	19,107,521
					e)	Testing	7,815,022
					f)	Royalty	22,160,573
				7a		**Amt utilised for Capital Exp. (P&C)**	
					a)	Equipments for IRCC	757,279
					b)	Equipments for Project	654,373,976
					c)	Book Project	112,335
					d)	Furniture & Fixtures	17,325
				7b		**Other Accounts (P&C)**	
					a)	IRCC Payments	266,453,060
					b)	R&D Projects (Internal)	149,327,719
					c)	Investment made during the year	5,282,500,030
					d)	Interest transferred to IRCC A/c	243,888,419
					e)	Other Payments	439,067,137
				8		Excess of Income over Expenditure transferred to Endowment Fund	750,314
				9		*Closing Balance*	
						Cash in Hand and at Bank	222,726,066
		GRAND TOTAL	**18,609,852,969**			**GRAND TOTAL**	**18,609,852,969**

INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

ENDOWMENT FUND A/C

BALANCE SHEET AS ON 31-03-2012

Sr. No.		**Liabilities**		**Current year 2011-2012**	**Previous year 2010 – 2011**
1		Capital Fund		428196747	427446433
2		Interest Received on Capital Investment		220725311	203012602
3		Suspense A/c		0	600224
4		Excess of Income Over Expenditure Transferred to Balance Sheet		52222528	17712709
		Grand Total		**701144586**	**648771968**
		Assets			
1		Investment / GoI 8% saving taxable Bond		0	21500000
2		Fixed Deposit / SBI		36000000	0
3		Fixed Deposit / Canara Bank		254555000	300000000
4		Fixed Deposit / OBC		396610000	22600000
5		Sundry Debtors (Main A/c)		0	299397769
6		Accrued interest		13977307	4597095
7		Cash at Bank		2279	677104
		Grand Total		**701144586**	**648771968**

INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

ENDOWMENT FUND A/C

INCOME AND EXPENDITURE ACCOUNT FOR THE PERIOD 01/04/2011 TO 31/03/2012

Sr. No.		INCOME		Current year 2011-2012	Previous year 2010 – 2011
1		Interest on Investment Govt. of India 8 % saving taxable Bonds		491850	4799816
2		Interest on Investment/ Canara		22897431	11778770
3		Interest on Investment/ OBC		26381011	473112
4		Interest on Investment/SBI		1853014	1708176
5		Prior Period Income		600224	0
6		Less : Interest received less due to Premature Encashment of FD.		0	1046900
		Grand Total		**52223530**	**17712974**
		EXPENDITURE			
1		Bank Charges		1002	265
2		Excess of Income Over Expenditure Transferred to Balance Sheet		52222528	17712709
		Grand Total		**52223530**	**17712974**

INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

ENDOWMENT FUND ACCOUNT

Receipt and Payments Account for the period 01/04/2011 to 31/03/2012

	RECEIPTS	Current year 2011-12		PAYMENTS	Current year 2011-12
1	**Opening Balance**		1	Fixed Deposit/ Canara Bank	50000000
	Cash at Bank	677104	2	Fixed Deposit/ OBC	374010000
2	Investment/GOI 8 % Saving Bond	21500000	3	Fixed Deposit/ SBI	36000000
3	Fixed Deposit matured / Canara Bank	99704396	4	Inter Dept. Transfer to Main A/c	107800000
4	IIT Bombay Main A/c.	750314	5	Bank Charges	1002
5	Inter Dept. Transfer from Main A/c.	407197769	6	**Closing Balance**	
6	Interest on Investment/OBC	16995338		Cash at Bank	2279
7	Interest on Investment/ Canara	15899415			
8	Interest on Investment/ Govt. of India 8% Saving Bonds	491850			
9	Accrued Interest	4597095			
	Grand Total	**567813281**		**Grand Total**	**567813281**

INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY
GENERAL PROVIDENT FUND-CUM-PENSION-CUM-GRATUITY FUND SCHEME
BALANCE SHEET AS AT 31.03.2012

LIABILITIES				
2010-2011 Rs. Ps.	**PARTICULARS**			**2011-2012 Rs. Ps.**
	I. General Provident Fund A/c			
818803252.00	Opening Balance as on 01.04.2011	861079103.00		
812365.00	Less:JE for 09-10 not considered	0.00		
817990887.00		861079103.00		
139492964.00	GPF Subscription Account	148188476.00		
63014810.00	Add: Int. Credited to GPF Subs A/c	68088510.00		
1020498661.00		1077356089.00		
159419558.00	Less : GPF Withdrawal	135835175.00		
861079103.00			941520914.00	
	Less : GPF Advance A/c			
6108970.00	Opening Balance on 01.04.2011	8214253.00		
812365.00	Less: JE for 09-10 not considered	0.00		
5296605.00		8214253.00		
11893805.00	Add: Paid during the year	10330900.00		
17190410.00		18545153.00		
8976157.00	Less: Recovery of advance	10066298.00		
8214253.00		8478855.00		
0.00	Less: Transferable from IIT Main A/c	0.00		
8214253.00			8478855.00	
852864850.00				933042059.00
	II. Bills Payable / Sundry Creditors A/c			
8564962.00	Opening Balance on 01.04.2011		10345584.00	
10345584.00	Add: Credited to Bills Payable A/c		13222185.00	
18910546.00			23567769.00	
8564962.00	Less: Cleared during the year		10345584.00	
10345584.00				13222185.00
	III. Deposit A/c for unclaimed subscription A/c			
7695.00	Opening Balance on 01.04.2011		5404729.00	
5404729.00	Add: Taken to Deposit A/c		0.00	
5412424.00			5404729.00	
7695.00	Less: Cleared during the year		4864256.00	
5404729.00				540473.00
868615163.00	**Grand Total**			**946804717.00**

ASSETS			
2010-2011 Rs. Ps.	PARTICULARS		2011-2012 Rs. Ps.
	I. Fixed Term Deposit A/c – SBI		
162000000.00	a) Opening Balance as on 01.04.11	70000000.00	
4500000.00	b) Add: Invested during the year	79000000.00	
5000000.00	c) Add: Reinvested out of 'd' below	19000000.00	
171500000.00		168000000.00	
101500000.00	d) Less: Realised during the year	30000000.00	
70000000.00	Total – I		138000000.00
	II. Special Deposit Scheme A/c		
27144965.00	a) Opening Balance as on 01.04.11	27144965.00	
27144965.00	Total – II		27144965.00
	III. FTD A/c - Canara Bank		
72000000.00	a) Opening Balance as on 01.04.11	79500000.00	
60000000.00	b) Add: Invested during the year	65000000.00	
13000000.00	c) Add: Reinvested out of 'd' below	7000000.00	
145000000.00		151500000.00	
65500000.00	d) Less: Realised during the year	13000000.00	
79500000.00	Total – III		138500000.00
	IV. FTD A/c – Oriental Bank of Commerce		
42500000.00	a) Opening Balance as on 01.04.11	42500000.00	
0.00	b) Add: Invested during the year	65500000.00	
2000000.00	c) Add: Reinvested out of 'd' below	6000000.00	
44500000.00		114000000.00	
2000000.00	d) Less: Realised during the year	6000000.00	
42500000.00	Total – IV		108000000.00
	V. Govt. of India 8% Saving Bonds 2003 A/c		
428000000.00	a) Opening Balance as on 01.04.11	615500000.00	
235500000.00	b) Add: Invested during the year	0.00	
663500000.00		615500000.00	
48000000.00	c) Less: Realised during the year	101000000.00	
615500000.00	Total – V		514500000.00
	VI. Bills Receivable / Sundry Debtors A/c		
5958056.00	Opening Balance as on 01.04.2011	0.00	
	Taken to Bills Receivable A/c	87291.00	
5958056.00	Less: Cleared during the year	0.00	
0.00	Total – VI		87291.00
	VII. Outstanding Income		
	1) Accrued Int. on FTD A/c – SBI		
2659756.00	Opening Balance	553384.00	
553384.00	Add: Provision made during the year	1857731.00	
3213140.00		2411115.00	
2659756.00	Less: Cleared during the year	553384.00	
553384.00			1857731.00

2010-2011 Rs. Ps.	PARTICULARS		2011-2012 Rs. Ps.
	2) Accrued Interest on Spl. Deposit Scheme A/c		
542899.00	Opening Balance	542899.00	
542899.00	Add: Provision made during the year	542899.00	
1085798.00		1085798.00	
542899.00	Less: Cleared during the year	542899.00	
542899.00			542899.00
	3) Accrued Int. on FTD A/c- Canara Bank		
1198214.00	Opening Balance	216623.00	
216623.00	Add: Provision made during the year	1716767.00	
1414837.00		1933390.00	
1198214.00	Less: Cleared during the year	216623.00	
216623.00			1716767.00
	4) Accrued Interest on FTD A/c – Oriental Bank of Commerce		
848439.00	Opening Balance	826013.00	
826013.00	Add: Provision made during the year	2244789.00	
1674452.00		3070802.00	
848439.00	Less: Cleared during the year	826013.00	
826013.00			2244789.00
	5) Accrued Interest on Govt. of India 8% Saving Bonds 2003 A/c		
3176001.00	Opening Balance	8206665.00	
8206665.00	Add: Provision made during the year	6859999.00	
11382666.00		15066664.00	
3176001.00	Less: Cleared during the year	8206665.00	
8206665.00			6859999.00
	VIII. Closing Balance		
0.00	a) Cash in hand	0.00	
23624614.00	b) Cash at Bank	7350276.00	
23624614.00			7350276.00
868615163.00	**Grand Total**		**946804717.00**

INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY
GENERAL PROVIDENT FUND-CUM-PENSION-CUM-GRATUITY FUND SCHEME
INCOME AND EXPENDITURE ACCOUNT FOR THE PERIOD FROM 01/04/2011 TO 31/03/2012

2010-2011 Rs. Ps.	PARTICULARS		2011-2012 Rs. Ps.
	INCOME		
63361762.00	By Interest payable to GPF Subscribers A/c		
	(Transferred from IIT Main A/c)	68001219.00	
0.00	Add: JE (to be trfd from Main A/c)	87291.00	
63361762.00			68088510.00
5229705.00	By Interest on FTD A/c – SBI	9769127.00	
138542.00	Less: Pertains to 09-10	0.00	
138542.00	Less: Int trfd back from Main A/c	0.00	
4952621.00	(Int. realised on Investment)	9769127.00	
553384.00	Add: JE (Accrued but not recd.)	1857731.00	
5506005.00			11626858.00
1628698.00	By Int. on Special Deposit Scheme A/c	1628698.00	
	(Int. realised on Investment)		
542899.00	Add: JE (Accrued but not recd.)	542899.00	
2171597.00			2171597.00
2569181.00	By Int. on FTD A/c - Oriental Bank of Commerce	4767657.00	
1111.00	Less: Int on GOI Bonds wrongly credited	0.00	
2568070.00	(Int. realised on Investment)	4767657.00	
826013.00	Add: JE (Accrued but not recd.)	2244789.00	
3394083.00			7012446.00
1582105.00	By Int. on FTD A/c - Canara Bank	5555964.00	
173125.00	Less: Int on FTD pertaining to CPF wrongly Cr.	0.00	
1408980.00	(Int. realised on investment)	5555964.00	
216623.00	Add: JE (Accrued but not received)	1716767.00	
1625603.00			7272731.00
41919776.89	By Int. on Govt. of India 8% Saving Bonds 2003 A/c	35691302.00	
0.00	Less: Int.on OBC wrongly Credited	92078.00	
41919776.89		35599224.00	
1111.00	Less: Trfd. Back from Main A/c	0.00	
1111.00	Less: Pertain to 09-10	0.00	
41917554.89	(Int. realised on Investment)	35599224.00	
8206665.00	Add: JE (Accrued but not received)	6859999.00	
50124219.89			42459223.00
240000.00	By Deposit Linked Insurance A/c		60000.00
	(Amount transferred from IIT Main A/c)		
126423269.89	**Grand Total**		**138691365.00**

2010-2011 Rs. Ps.	PARTICULARS		2011-2012 Rs. Ps.
	EXPENDITURE		
	To Interest payable to GPF Subscribers A/c		
63361762.00	Credited to GPF Subscribers A/c	68001219.00	
0.00	Add: JE	87291.00	
63361762.00			68088510.00
4952621.00	To Interest on FTD A/c – SBI	9769127.00	
	(Int. realised & transferred to Main A/c)		
553384.00	Add: JE (to be trfd to Main A/c)	1857731.00	
5506005.00			11626858.00
1628698.00	To Interest on Special Deposit Scheme A/c	1628698.00	
	(Int. realised & transferred to Main A/c)		
542899.00	Add: JE (to be trfd to Main A/c)	542899.00	
2171597.00			2171597.00
2569181.00	To Interest on FTD – Oriental Bank of Commerce	4767657.00	
1111.00	Less: Rectification of Int. on GOI Bonds wrongly Cr.	0.00	
2568070.00	(Int. realised & transferred to Main A/c)	4767657.00	
826013.00	Add: JE (to be trfd to Main A/c)	2244789.00	
3394083.00			7012446.00
1582105.00	To Interest on FTD A/c - Canara Bank	5555964.00	
173125.00	Less: Rectification of Int. on FTD pertaining to CPF	0.00	
1408980.00	wrongly credited	5555964.00	
	(Interest realised & transferred to Main A/c)		
216623.00	Add: JE (to be trfd to Main A/c)	1716767.00	
1625603.00			7272731.00
41917554.89	To Int. on Govt. of India 8% Saving Bonds 2003 A/c	35691302.00	
0.00	Less: Rectification of Int. on OBC wrongly Cr.	92078.00	
41917554.89	(Interest realised & transferred to Main A/c)	35599224.00	
8206665.00	Add: JE (to be trfd to Main A/c)	6859999.00	
50124219.89			42459223.00
240000.00	To Deposit Linked Insurance A/c		60000.00
	(Paid during the year)		
126423269.89	**Grand Total**		**138691365.00**

INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY
GENERAL PROVIDENT FUND-CUM-PENSION-CUM-GRATUITY FUND SCHEME
RECEIPTS AND PAYMENTS ACCOUNT FOR THE PERIOD FROM 01/04/2011 TO 31/03/2012

2010-2011 Rs. Ps.	PARTICULARS		2011-2012 Rs. Ps.
	RECEIPTS		
75109031.00	To Cash and Bank Balance at the commencement of the year		23624614.00
	To G.P.F. Subscription A/c		
131884527.00	Transferred from IIT Main A/c (Recoveries made from salary during the year)	144734015.00	
4331095.00	Received directly from the employees	3415981.00	
3277342.00	Other Adjustments	38480.00	
139492964.00			148188476.00
	To G.P.F. Advance A/c		
6881672.00	Transferred from IIT Main A/c (Recoveries made from salary bills during the year)	7608343.00	
2016485.00	By adjustments from fresh advances	2403505.00	
78000.00	Other Adjustments	54450.00	
8976157.00			10066298.00
5958056.00	To Sundry Debtors A/c		0.00
96500000.00	To Fixed Term Deposit A/c – SBI (Amount realised on maturity)		11000000.00
4952621.00	To Interest on Fixed Term Deposit – SBI A/c (Int. realised on Investment)	9769127.00	
138542.00	Int. pertaining to 09-10 credited	0.00	
138542.00	Int. trfd back from Main A/c	0.00	
5229705.00			9769127.00
1628698.00	To Interest on Special Deposit Scheme A/c (Int. realised on investment)		1628698.00
63361762.00	To Interest payable to GPF Subscribers A/c (Amount transferred from IIT Main A/c)		68088510.00
240000.00	To Deposit Linked Insurance A/c (Amount transferred from IIT Main A/c)		60000.00
3820880.00	To Suspense A/c		4271200.00
926.00	To Bank .Charges A/c (Amount transferred from IIT Main A/c)		710.00

2010-2011 Rs. Ps.	PARTICULARS		2011-2012 Rs. Ps.
1408980.00	To Int. on FTD A/c – Canara Bank	5555964.00	
	(Int. realised on Investment)		
173125.00	Int. pertaining to CPF wrongly credited in GPF A/c	0.00	
1582105.00			5555964.00
2568070.00	To Int. on FTD A/c – Oriental Bank of Commerce	4767657.00	
	(Int. realised on investment)		
1111.00	Int on GOI Bonds wrongly credited	0.00	
2569181.00			4767657.00
52500000.00	To FTD A/c – Canara Bank		6000000.00
	(Amount realised on maturity)		
848439.00	To Accrued Int. on FTD –Oriental Bank of Commerce		826013.00
	(Int. For 10-11 realised during the year)		
2659756.00	To Accrued Int. on FTD A/c – SBI	553384.00	
	(Int. for 10-11 realised during the year)		
138542.00	Int on FTD SBI for 09-10 wrongly credited	0.00	
1111.00	Int on FTD GOI Bonds for 09-10 wrongly credited	0.00	
41146.00	Int on FTD SBI for 10-11 wrongly credited	0.00	
2840555.00			553384.00
1198214.00	To Accrued Int. on FTD A/c- Canara Bank	216623.00	
	(Int. For 10-11 realised during the year)		
124829.00	Int on Canara FTD A/c wrongly credited	0.00	
1323043.00			216623.00
542899.00	To Accrued Int. on Special Deposit Scheme A/c		542899.00
	(Int. For 10-11 realised during the year)		
41917554.89	To Int. on GOI 8% Saving Bonds 2003 A/c	35599224.00	
	(Int. realised on Investment)		
1111.00	Int on GOI Bonds for 09-10 credited	0.00	
1111.00	Int. trfd back from Main A/c	0.00	
0.00	Int on FTD OBC A/c wrongly credited	92078.00	
41919776.89			35691302.00
3176001.00	To Accrued Int on GOI 8% Saving Bonds 2003 A/c		8206665.00
	(Int. For 10-11 realised during the year)		
48000000.00	To GOI 8% Saving Bonds 2003 A/c	101000000.00	
	(Amount realised on maturity)		
25375667.00	Int on GOI Bonds wrongly credited	0.00	
73375667.00			101000000.00
5404729.00	To Deposit A/c for Unclaimed Subscription A/c		0.00
	(Unclaimed Subs. Taken to Deposit A/c)		
586400574.89	**Grand Total**		**440058140.00**

2010-2011 Rs. Ps.	PARTICULARS		2011-2012 Rs. Ps.
	PAYMENTS		
	By G.P. Subscription A/c		
156868511.00	1) Withdrawals and Final Payments made during the year	135769495.00	
2551047.00	2) Other Adjustments	65680.00	
159419558.00			135835175.00
	By G.P. Advance A/c		
11811100.00	1) Temp.advances paid during the year	10300900.00	
82705.00	2) Other Adjustments	30000.00	
11893805.00			10330900.00
4500000.00	By Fixed Term Deposit A/c – SBI (Amount invested during the year)		79000000.00
1628698.00	By Int. on Special Deposit Scheme A/c (Interest realised and transferred to IIT Main A/c)		1628698.00
4952621.00	By Int. on Fixed Term Deposit A/c – SBI (Interest realised and transferred to IIT Main A/c)	9769127.00	
138542.00	Interest excess trfd to Main A/c	0.00	
5091163.00			9769127.00
3820880.00	By Suspense A/c		4271200.00
926.00	By Bank Commission Charges A/c	710.00	
10075.00	Bank Charges pertaining to 09-10	0.00	
11001.00			710.00
235500000.00	By GOI 8% Saving Bonds 2003 A/c (Amount invested during the year)	0.00	
25375667.00	Rectification of Int on GOI Bonds wrongly credited.	0.00	
260875667.00			0.00
60000000.00	By Fixed Term Deposit A/c – Canara Bank (Amt. invested during the year)		65000000.00
8564962.00	By Sundry Creditors A/c (Cleared during the year)		10345584.00
1408980.00	By Int. on FTD A/c - Canara Bank (Int. realised and transferred to Main A/c)	5555964.00	
173125.00	Rectification of Int pertaining to CPF A/c wrongly credited.	0.00	
1582105.00			5555964.00

2010-2011 Rs. Ps.	PARTICULARS		2011-2012 Rs. Ps.
240000.00	By Deposit Linked Insurance A/c (Paid during the year)		60000.00
0.00	By Fixed Term Deposit A/c – Oriental Bank of Commerce (Amt. invested during the year)		65500000.00
2568070.00	By Interest on FTD – Oriental Bank of Commerce (Interest realised and transferred to Main A/c)	4767657.00	
1111.00	Rectification of Int on GOI Bonds wrongly credited.	0.00	
2569181.00			4767657.00
41917554.89	By Int. on GOI 8% Saving Bonds 2003 A/c (Interest realised and transferred to Main A/c)	35599224.00	
1111.00	Interest excess trfd to Main A/c	0.00	
	Rectification of Int on FTD OBC wrongly credited	92078.00	
41918665.89			35691302.00
346952.00	By Interest payable to GPF Subscriber A/c (Excess credited to GPF A/c for Previous Year trfd back to Main A/c)		87291.00
124829.00	By Accrued Int on FTD A/c Canara Bank A/c (Rectification of Int on FTD Wrongly credited)		0.00
180799.00	By Accrued Int on FTD A/c SBI A/c (Rectification of Int on FTD & GOI Bonds Wrongly credited)		0.00
7695.00	By Deposit A/c for Unclaimed Subscription A/c (Unclaimed Subscription A/c taken to Deposit A/c cleared during the year)		4864256.00
	By Closing Balance		
0.00	a) Cash in Hand	0.00	
23624614.00	b) Cash at Bank	7350276.00	
23624614.00			7350276.00
586400574.89	**Grand Total**		**440058140.00**

INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

CONTRIBUTORY PROVIDENT FUND-CUM-GRATUITY FUND SCHEME

BALANCE SHEET AS AT 31/03/2012

LIABILITIES			
2010-2011	**PARTICULARS**		**2011-2012**
Rs. Ps.			**Rs. Ps.**
	I. Contributory Provident Fund A/c		
124300620.00	Opening Balance as on 1.4.2011	165397545.00	
19738724.00	CPF Subscription Account	9378382.00	
144039344.00		174775927.00	
12671970.00	Interest Credited to CPF Subscribers A/c	7830501.00	
12137362.00	Institute Contribution to CPF A/c	3783749.00	
168848676.00		186390177.00	
3451131.00	Less : CPF Withdrawal	68840086.00	
165397545.00		117550091.00	
	Less: CPF Advance A/c		
398794.00	Opening Balance as on 1.4.2011	1544914.00	
2636140.00	Add: Paid during the year	60000.00	
3034934.00		1604914.00	
1490020.00	Less: Recovery during the year	40000.00	
1544914.00		1564914.00	
163852631.00			115985177.00
	II. Bills Payable / Sundry Creditors A/c		
1052990.00	Opening Balance as on 1.4.2011	1891445.00	
1891445.00	Add: Accrued Interest taken to Bills Payable A/c	1960924.00	
2944435.00	(Interest on Invst to be trfd to Main A/c)	3852369.00	
1052990.00	Less : Cleared during the year	1891445.00	
1891445.00			1960924.00
165744076.00	**GRAND TOTAL**		**117946101.00**

ASSETS			
2010-2011	**PARTICULARS**		**2011-2012**
Rs. Ps.			**Rs. Ps.**
	I. Fixed Term Deposit A/c – S.B.I		
10300000.00	Opening Balance as on 1.4.2011	7800000.00	
0.00	a) Invested during the year	12500000.00	
4800000.00	b) Add: Amt reinvested out of 'c' below	4000000.00	
15100000.00		24300000.00	
7300000.00	c) Less: Realised during the year	11500000.00	
7800000.00	Total - I		12800000.00
20467036.00	II. Speical Deposit Scheme A/c Opening Balance as on 1.4.11	20467036.00	
20467036.00	Total - II		20467036.00
	III. FTD A/c – Canara Bank		
56000000.00	Opening Balance as on 1.4.2011	84500000.00	
28500000.00	a) Invested during the year	10000000.00	
12500000.00	b) Amount reinvested out of 'c' below	5000000.00	
97000000.00		99500000.00	
12500000.00	c) Less: Realised during the year	75500000.00	
84500000.00	Total – III		24000000.00
	IV. FTD A/c - Oriental Bank of Commerce		
16200000.00	Opening Balance as on 1.4.2011	42200000.00	
26000000.00	a) Invested during the year	14000000.00	
0.00	b) Amount reinvested out of 'c' below	26000000.00	
42200000.00		82200000.00	
0.00	c) Less: Realised during the year	26000000.00	
42200000.00	Total – IV		56200000.00
	V. Bills Receivable / Sundry Debtors A/c		
6886673.00	Opening Balance as on 01.04.2011	0.00	
6886673.00	Less: Cleared during the year	0.00	
0.00			0.00

2010-2011 Rs. Ps.	PARTICULARS		2011-2012 Rs. Ps.
	VI. Outstanding Incomes		
	1. Accrued Int. on FTD A/c – S.B.I		
131075.00	Opening Balance	86440.00	
86440.00	Add : Provision made during the year	165253.00	
217515.00		251693.00	
131075.00	Less: Cleared during the year	86440.00	
86440.00			165253.00
	2. Accrued Int. on Special Deposit Scheme A/c		
409341.00	Opening Balance	409341.00	
409341.00	Add: Provision made during the year	409341.00	
818682.00		818682.00	
409341.00	Less: Cleared during the year	409341.00	
409341.00			409341.00
	3. Accrued Int. on FTD A/c- Canara Bank		
199448.00	Opening Balance	1073754.00	
1073754.00	Add: Provision made during the year	161894.00	
1273202.00		1235648.00	
199448.00	Less: Cleared during the year	1073754.00	
1073754.00			161894.00
	4. Accrued Int. on FTD A/c – OBC		
313126.00	Opening Balance	321910.00	
321910.00	Add: Provision made during the year	1224436.00	
635036.00		1546346.00	
313126.00	Less: Cleared during the year	321910.00	
321910.00			1224436.00
	VII. Closing Balance		
0.00	a) Cash in hand		
8885595.00	b) Cash at Bank	2518141.00	
8885595.00			2518141.00

165744076.00	**GRAND TOTAL**	**117946101.00**

INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

CONTRIBUTORY PROVIDENT FUND CUM-GRATUTIY FUND SCHEME

INCOME AND EXPENDITURE ACCOUNT FOR THE PERIOD FROM 01/04/2011 TO 31/03/2012

2010-2011 Rs. Ps.	PARTICULARS		2011-2012 Rs. Ps.
	INCOME		
12671970.00	By Interest payable to CPF Subscribers A/c (Transferred from IIT Main A/c)		7831877.00
531930.00	By Interest on FTD A/c – S.B.I	973745.00	
52500.00	Less wrongly credited	0.00	
479430.00	(Int. realised on investment)	973745.00	
86440.00	Add : J.E. (Accrued but not received)	165253.00	
565870.00			1138998.00
1228022.00	By Interest on Special Deposit Scheme A/c (Int. realised on Investment)	1228022.00	
409341.00	Add: J.E. (Accrued but not received)	409341.00	
1637363.00			1637363.00
4393055.00	By Interest on FTD A/c – Canara Bank (Int. realised on Investment)	3443653.00	
1073754.00	Add: J.E. (Accrued but not received)	161894.00	
5466809.00			3605547.00
1029378.00	By Interest on FTD A/c- Oriental Bk of Commerce	2789136.00	
90000.00	Less: Int. on OBC GPF A/c wrongly credited	0.00	
	Less Accrued Int on OBC wrongly credited	3945.00	
939378.00	(Int. realised on Investment)	2785191.00	
321910.00	Add: J.E. (Accrued but not received)	1224436.00	
1261288.00			4009627.00
21603300.00	**GRAND TOTAL**		**18223412.00**

2010-2011 Rs. Ps.	PARTICULARS		2011-2012 Rs. Ps.
	EXPENDITURE		
12671970.00	To Interest payable to CPF Subscribers A/c		7831877.00
	(Credited to CPF Subscribers A/c)		
479430.00	To Interest on FTD A/c -SBI	973745.00	
	(Interest realised & transefrred to Main A/c)		
86440.00	Add : J.E. (to be trfd to Main A/c)	165253.00	
565870.00			1138998.00
1228022.00	To Interest on Special Deposit Scheme A/c	1228022.00	
	(Int. realised and transferred to Main A/c)		
409341.00	Add: J.E. (to be trfd to Main A/c)	409341.00	
1637363.00			1637363.00
4393055.00	To Interest on FTD A/c- Canara Bank	3443653.00	
	(Int. realised and transferred to Main A/c)		
1073754.00	Add: J.E. (to be trfd to Main A/c)	161894.00	
5466809.00			3605547.00
1029378.00	To Interest on FTD A/c - Oriental Bk of Commerce	2789136.00	
90000.00	Less: Rect o.f Int. on OBC GPF A/c wrongly credited	0.00	
	Less: Rect of Accrued Int on OBC wrongly credited	3945.00	
939378.00	(Int. realised & transferred to Main A/c)	2785191.00	
321910.00	Add: J.E. (to be trfd to Main A/c)	1224436.00	
1261288.00			4009627.00
21603300.00	**GRAND TOTAL**		**18223412.00**

INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

CONTRIBUTORY PROVIDENT FUND-CUM-GRATUTIY FUND SCHEME

RECEIPTS AND PAYMENTS ACCOUNT FOR THE PERIOD FROM 01/04/2011 TO 31/03/2012

2010-2011 Rs. Ps.	PARTICULARS		2011-2012 Rs. Ps.
	RECEIPTS		
14048117.00	To Cash and Bank Balance at the commencement of the year		8885595.00
	To C.P. F Subscription A/c		
19568929.00	Transferred from IIT Main A/c (Recoveries Made from salary during the year)	8959098.00	
	Received directly from the employees	404922.00	
169795.00	Other Adjustments	14362.00	
19738724.00			9378382.00
	To C.P. F Advance A/c		
924330.00	Transferred from IIT Main A/c (Recoveries Made from salary during the year)	40000.00	
565190.00	Adjustments from fresh advances	0.00	
500.00	Other Adjustments	0.00	
1490020.00			40000.00
11219979.00	To Institute contribution to CPF A/c Transferd from IIT Main A/c	2922945.00	
0.00	Employer's contribution received from other organisatio	860804.00	
917383.00	Institute contribution less transfered for pre. Years 08-09 & 09-10	0.00	
39719.00	Rectification of non payable contribution to be trfd to Main A/c Wrongly debited to Institute Constribution)	0.00	
85458.00	Lien Contribution wrongly Credited to Institute	0.00	
12262539.00	Contribution A/c		3783749.00
10570528.00	To Interest payable to CPF Subscriber's A/c (Transferred from IIT Main A/c for 2011-12)	7831877.00	
2101442.00	Intrest payable less transeferd for 08-09- & 09-10	0.00	
12671970.00			7831877.00
479430.00	To Interest on Fixed Term Deposit A/c – S.B.I (Interest realised on investment)	973745.00	
52500.00	Amount wrongly credited	0.00	
531930.00			973745.00
6886673.00	To Sundry Debtors		0.00
1228022.00	To Interest on Special Deposit Scheme A/c (Interest realised on investment)		1228022.00
313126.00	To Accrued Int. on FTD -Oriental Bank of Commerce (Int. For 10-11 realised during the year)		321910.00

2010-2011 Rs. Ps.	PARTICULARS		2011-2012 Rs. Ps.
131075.00	To Accrued Int. on Fixed Term Deposit A/c – S.B.I	86440.00	
	(Int. For 10-11 realised during the year)		
48058.00	Int. on FTD-SBI wrongly credited	0.00	
179133.00			86440.00
8839.00	To Suspense A/c		834884.00
2660.00	To Bank Commission Charges A/c		879.00
	(Transferred from Main A/c)		
-	To FTD A/c – Canara Bank		70500000.00
	(Amount realised on Maturity)		
409341.00	To Accrued int. on Special Deposit Scheme A/c		409341.00
	(Interest for 10-11 realised during the year)		
4393055.00	To Interest on FTD A/c – Canara Bank		3443653.00
	(Interest realised on investment)		
199448.00	To Accrued interest on FTD A/c – Canara Bank		1073754.00
	(Interest for 10-11 realised during the year)		
2500000.00	To FTD A/c – SBI		7500000.00
	(Amount realised on Maturity)		
939378.00	To Int. on FTD A/c- Oriental Bank of Commerce	2785191.00	
	(Interest realised on investment)		
90000.00	Int. on FTD-OBC GPF A/c wrongly credited	0.00	
	Accrued Int on FTD-OBC wrongly credited	3945.00	
1029378.00			2789136.00
#VALUE!	**GRAND TOTAL**		**119081367.00**

2010-2011 Rs. Ps.	PARTICULARS		2011-2012 Rs. Ps.
	PAYMENTS		
	By C.P.F Subscription A/c		
	1) Withdrawals and Final Payments Made during the year		
1540691.00	a) Subscription	4343094.00	
1029055.00	b) Institute Contribution	641459.00	
0.00	c) Non payable Cont.trfd to Main A/c	55489.00	
0.00	d) Subscription in r/o NPS subscribers trfd to Main A/c & Cr to NPS subs.	38905787.00	
0.00	e) Contribution in r/o NPS subscribers trfd to Main A/c & Cr to NPS Contribution	24862695.00	
881385.00	f) Other Adjustments	31562.00	
3451131.00			68840086.00
	By C.P.F Advance A/c		
2595640.00	Advances paid during the year	60000.00	
40500.00	Other Adjustments	0.00	
2636140.00			60000.00
479430.00	By Int. on Fixed Term Deposit A/c – S.B.I (Interest realised on Investment and transferred to IIT Main A/c)	973745.00	
52500.00	Rectification of amount wrongly credited	0.00	
531930.00			973745.00
0.00	By Interest payable to CPF subscribers A/c excess trfd in 2010-11 trfd back to Main A/c		1376.00
1228022.00	By Int. on Special deposit Scheme A/c (Interest realised on investment and transferred to IIT Main A/c)		1228022.00
28500000.00	By FTD A/c - Canara Bank (Invested during the year)		10000000.00
2660.00	By Bank Commission Charges A/c		879.00
1052990.00	By Sundry Creditors A/c (Cleared during the year)		1891445.00
8839.00	By Suspense A/c		834884.00

4393055.00	By Int. on FTD A/c - Canara Bank (Int. realised and transferred to IIT Main A/c)	3443653.00
26000000.00	By Fixed Term Deposit A/c – Oriental Bk of Commerce (Invested during the year)	14000000.00

2010-2011 Rs. Ps.	PARTICULARS		2011-2012 Rs. Ps.
939378.00	By Int. on FTD A/c-Oriental Bank of Commerce (Int. realised and trfd to Main A/c)	2785191.00	
90000.00	Rectification of Int. on FTD-OBC GPF A/c	0.00	
	Rectification of Acc.Int FTD-OBC	3945.00	
1029378.00	wrongly credited		2789136.00
0.00	By Fixed Term Deposit A/c - SBI (Invested during the year)		12500000.00
48058.00	By Accrued Int. on FTD-SBI (Rectification of Interest on FTD-SBI wrongly credited to Accrued Int. on FTD-SBI)		0.00
	By Institute Contribution to CPF A/c (Non payable Inst. Cont. to be trfd to Main A/c		
39719.00	wrongly debited to Institute Contribution)	0.00	
85458.00	Rectification of lien constribution wrongly		
125177.00	Credited to Institute Contribution		0.00
	By Closing Balance		
0.00	a) Cash in hand		
8885595.00	b) Cash at Bank	2518141.00	
8885595.00			2518141.00
77892975.00	**GRAND TOTAL**		**119081367.00**

INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

POST RETIREMENT MEDICAL BENEFIT SCHEME

BALANCE SHEET AS ON 31ST MARCH 2012

LIABILITIES			
AMOUNT 2010-2011 Rs Ps	**PARTICULARS**	Rs Ps	**AMOUNT 2011-2012** Rs Ps
70000000.00	IRCC FUND		70000000.00
	Subscription Fund-Existing Employees		
11972320.00	Opening Fund	13049095.00	
2184922.00	Add: Subscription during the year	2230605.00	
	Less: Subscription in r/o retired employees wrongly credited to subscription fund existing employee in previous years	1919115.00	
22103.00	Less: Wrongly credited to Subscription A/c	-	
244839.00	Add: Interest payable on subscription	325981.00	
12504.00	Less: Refund of Subscription	84987.00	
540.00	Less: Rectification of an amount wrongly credited		
0.00	Less: Adjustment of interest excess credited in previous years	34577.00	
	Less: Op. balance of subscription in r/o employees retired in 11-12	1181362.00	
1317839.00	Less: Subscription of Retired Employees for 11-12	403139.00	
13049095.00	**Closing Fund**		11982501.00
	Subscription Fund-Retired Employees		
9216526.00	Opening Fund	10534365.00	
	Add: Subscription in r/o retired employees wrongly credited to subscription fund existing employees in previous years	1919115.00	
	Add: Op balance of subscription in r/o of employees retired in 11-12	1181362.00	
1317839.00	Add: Subscription in r/o retired employees for 11-12	403139.00	
10534365.00	**Closing Fund**		14037981.00
	General Fund		
28034479.77	Opening Balance	30317380.00	
	Add: Adjustment of interest excess credited in previous years	34577.00	
2282900.23	Add: Income during the year (Excess Income over	4427112.00	
30317380.00	Expenditure)		34779069.00
123900840.00	**Grand Total**		**130799551.00**

ASSETS			
AMOUNT 2010-2011	**PARTICULARS**		**AMOUNT 2011-2012**
Rs Ps		Rs Ps	Rs Ps
	INVESTMENTS:		
	Fixed Deposit / RBI Bonds		
84000000.00	Op Balance as on 1.4.2011	99000000.00	
85000000.00	Add: Amt Invested during the year	-	
169000000.00		99000000.00	
70000000.00	Less: Realised during the year	4000000	
99000000.00			95000000.00
	Short Term Deposit / Canara Bank		
7850000.00	Opening Balance as on 1.4.2011	6000000	
1850000.00	Less: Realised during the year	5000000	
6000000.00			1000000.00
	Short Term Deposit / SBI		
14500000.00	Opening Balance as on 1.4.2011	5350000	
4350000.00	Add: Invested during the year	7500000	
18850000.00		12850000	
13500000.00	Less: Realised during the year	-	
5350000.00			12850000.00
	Short Term Deposit / OBC		
6575615.00	Opening Balance as on 1.4.2011	6575615.00	
-	Add: Amt Invested during the year	6500000.00	
6575615.00			13075615.00
	Accrued Interest		
1841458.00	Opening Balance as on 1.4.2011	2644927.00	
2236428.00	Add: Provision made during the year	2244280.00	
290004.00	Add: Short provision during 09-10	-	
4367890.00		4889207.00	
1722963.00	Less: Realised during the year	1591700.00	
2644927.00			3297507.00
	Cash & Bank Balance		
-	Cash in hand		
4330298.00	Cash at Bank	5576429.00	
4330298.00			5576429.00
123900840.00	**Grand Total**		**130799551.00**

INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

POST RETIREMENT MEDICAL BENEFIT SCHEME

INCOME AND EXPENDITURE ACCOUNT FOR THE PERIOD 01.4.2011 TO 31.3.2012

INCOME			
AMOUNT 2010-2011 Rs Ps	**PARTICULARS**		**AMOUNT 2011-2012** Rs Ps
5852540.56	By Interest on Investment / RBI Bond	6641200.00	
53333.33	Less: Accrued interest wrongly credited	-	
5799207.23	(Interest realised during the year)	6641200.00	
1230000.00	Add: JE (Interest accrued but not received)	1266667.00	
7029207.23			7907867.00
2153788.00	By Interest on Investment / SBI	888072.00	
1458752.00	Less: interest pertaining to 09-10	-	
695036.00	(Interest received during the year)	888072.00	
111764.00	Add: JE (Interest accrued but not received)	239069.00	
17554.00	Add: JE (short provision for the year 09-10)	-	
824354.00			1127141.00
539918.00	By Interest on Investment / Canara Bank	75870.00	
366842.00	Less: Accrued interest wrongly credited	-	
173076.00	(Interest realised during the year)	75870.00	
327082.00	Add: JE (Interest accrued but not received)	13462.00	
500158.00			89332.00
	By Interest on Investment / OBC	88145.00	
567582.00	Add: JE (Interest accrued but not received)	725082.00	
272450.00	Add: JE (short provision for the year 09-10)	-	
840032.00			813227.00
9193751.23	**Grand Total**		**9937567.00**

EXPENDITURE		
AMOUNT 2010-2011 Rs Ps	**PARTICULARS**	**AMOUNT 2011-2012** Rs Ps
6666012.00	Post Retirement Medical Fund Claim Paid	5184402.00
244839.00	To Provision towards Interest Payable to Existing PRMS Subscription A/c	325981.00
	To Bank Charges	72.00
2282900.23	To Excess of Income over expenditure transferred to General Fund	4427112.00
9193751.23	**Grand Total**	**9937567.00**

INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

POST RETIREMENT MEDICAL BENEFIT SCHEME

RECEIPTS AND PAYMENTS A/C FOR THE PERIOD 1.4.2011 TO 31.3.2012

RECEIPTS			
AMOUNT 2010-2011 Rs Ps	**PARTICULARS**	Rs Ps	**AMOUNT 2011-2012** Rs Ps
	Opening Balance		
3007310.77	Cash at Bank		4330298.00
2184922.00	To Subscription to Post Retirement Medical Fund A/c		2230605.00
13500000.00	To Short Term Deposit / SBI (Amt realised on Maturity)		
1850000.00	To Short Term Deposit / Canara Bank		5000000.00
-	(Amt realised on Maturity)		
5799207.23	To Interest on investment / RBI Bond	6641200.00	
53333.33	Accrued Interest wrongly credited	-	
5852540.56	(interest received on investment)		6641200.00
695036.00	To Interest on investment / SBI	888072.00	
	(interest received on investment)		
1458752.00	Interest for 2010- 11 credited	-	
2153788.00			888072.00
173076.00	To Interest on investment / Canara Bank	75870.00	
366842.00	Accrued Interest wrongly credited	-	
539918.00	(interest received on investment)		75870.00
-	To Interest on Investment / OBC		88145.00
2800000.00	To interest on investment / ICICI Bank	-	
	(Interest on RBI bond wrongly credited)		
70000000.00	To fixed Depost / RBI Bonds		4000000.00
	(Amt realised on Maturity)		
1722963.00	Accrued Interest		1591700.00
	(Interest for 10-11 realised during the year)		
22103.00	Sundry Debtors	-	
	(Cleared during the year)		
103633545.33	**Grand Total**		**24845890.00**

PAYMENTS		
AMOUNT 2010-2011 Rs Ps	**PARTICULARS**	**AMOUNT 2011-2012** Rs Ps
85000000.00	By Fixed Deposit / RBI Bonds (invested during the year)	-
4350000.00	By Short term deposit / SBI (invested during the year)	7500000.00
-	By Short term deposit / OBC (invested during the year)	6500000.00
1000.00	By Bank charges	72.00
6666012.00	By Post retirement medical fund claim (medical claim paid)	5184402.00
53333.33	By Interest on investment /RBI bond (rectification of accrued interest wrongly credited to interest on investment / RBI bonds)	-
366842.00	By Interest on investment / Canara Bank (By rectification of accrued interest wrongly credited to interest on Investment / Canara bank)	-
2800000.00	By Interest on investment / ICICI (rectification of interest on RBI Bond wrongly credited)	-
66060.00	By Subscription to Post Retirement Medical Fund (refund of Subscription & other adjustments)	84987.00
	By Closing Balance	
-	Cash in hand	-
4330298.00	Cash at Bank	5576429.00
103633545.33	**Grand Total**	**24845890.00**