Director’s Report
XLII Convocation
3rd July 2010
Indian Institute of Technology Kanpur
Professor Sanjay G. Dhande
Director

Contact: Office of Research & Development
Honorable Chairman, Board of Governors of the Indian Institute of Technology Kanpur, Professor M. Anandakrishnan, Distinguished Chief Guest, Honorable Prime Minister of India, Dr. Manmohan Singh, Honorable Governor of Uttar Pradesh, Shri B.L. Joshi, Members of the Board of Governors, Members of the Academic Senate, all graduating students and their family members, all members of faculty, staff and students, invited dignitaries, guests, and members of the media: I heartily welcome you all on this occasion of the forty-second convocation of the Indian Institute of Technology Kanpur.

It is with great pleasure and pride that I invite Dr. Manmohan Singh, a career bureaucrat, eminent professor and economist, who is rightly acclaimed as a thinker and scholar for our Convocation today. It is a historic moment for all of us connected with this glorious institution to have a philosopher-king in the person of Dr. Manmohan Singh join us for the Convocation in the Golden Jubilee year. He is well regarded for his diligence and the proverbial academic rigor he brings to his work, as well as for his accessibility and his self-effacing demeanor.

In August 2009, the Golden Jubilee celebration of the Institute was inaugurated by our alumnus Shri N. R. Narayana Murthy, Chief mentor of Infosys. The Institute organized several
academic, cultural, and sports events throughout the year. People from all walks of life, both from India and abroad participated.

Significantly, the academic year closing in May 2010 has been momentous, and I consider it a privilege to review our activities during this period. And let me begin my review by sharing the good news that DNA-ZEE News Survey and India Today rank IIT Kanpur as the best engineering college in India.

**ACADEMIC ACTIVITIES**

The academic year 2009-10 has had a successful run. The number of graduating students both at the undergraduate (B Tech - 313, M Sc (5 year Integrated) - 60, B Tech – M Tech Dual Degree (5 year) - 117, M Sc (2 year) - 86) and the postgraduate (M Tech - 386, M Des - 18, MBA - 52, VLFM – 32, PhD - 131) levels show a satisfactory trend. The enrollment in the Doctoral program as well as the publication record of the faculty and students for the academic year has considerably increased. Faculty and students published a large number of research papers in journals and conference proceedings. Books and book chapters published by the faculty are listed in the appendix of this report.
Graduation of the first batch of students in the M.Sc. (Integrated) Program in Economics

The Institute started the five-year integrated M.Sc. Program in Economics in 2005, under the aegis of the Department of Humanities and Social Sciences, with a view to training professional economists who are well-grounded in science and technology. The program admits students through the Joint Entrance Examination (JEE).

The program helps students to sharpen their analytical and modeling skills, and encourages original research through short course projects, term papers and a two-semester long M.Sc. project. As part of their training, students are exposed to a wide range of sophisticated statistical and mathematical software and databases. A significant feature of the program consists in students taking up internships with universities, international organizations and corporations, in India and abroad during their seventh and eighth semesters. Seven students from the fifth year batch and nine from the other batches of M.Sc. Economics programme had an opportunity to go on student exchanges to universities abroad, such as the Utrecht School of Economics in the Netherlands and Darmstadt University in Germany, among others.
The first batch of M.Sc. (Integrated) Economics is graduating in this convocation. The batch has shown excellent all-round performance. As a fitting recognition of their hard work and high caliber, all the thirteen students of this batch who applied for jobs have obtained superb placements. They have been placed in organizations such as the Citibank, Nomura, Deloitte Consulting, Deutsche Bank, Accenture, Genpact, and Daeyang Shipping Corporation. We are confident that the pioneering batch will act as torch-bearers for the subsequent batches in many other respects as well.

**Visionary Leaders for Futuristic Manufacturing - VLFM**

The Institute is very happy to graduate the second batch of students in the postgraduate program on VLFM. This program, it may be noted, was the outcome of an understanding between the Honourable Prime Minister of India, Dr Manmohan Singh and the Honourable Prime Minister of Japan. It is supported by the National Manufacturing Competitiveness Council (NMCC) of the Government of India. Along with IIM Kolkata and IIT Madras, IIT Kanpur is proud to lead this unique experiment of human resource development. VLFM program is one of its kind, jointly run by two IITs and one IIM. A unique academic experiment, it is hoped that this spirit of collaboration and cooperation will prosper in the coming years.
AWARDS AND HONORS

The faculty and students of IITK continue to break new grounds at the frontiers of research. This has been duly recognized in the form of various awards and honors to the faculty including fellowships of professional societies, editorship of international journals, and best paper awards to the students. A representative list of awards and honors to our faculty members is included as an addendum to the report.

Our students Arunabha Mohan Roy, Deepanshu Arora have been selected for the GE Foundation Scholar Leaders Program. Vishwas Aggarwal, Mayank Dang, Abhishek Kar, Kartikey Asthana, Dheeraj Pichapati Venkata, Mayank Baranwal, Geetak Gupta, Dinesh Bharadia received the University of Tokyo IIT Undergraduate Students Scholarship. Amritansh Frank received the IITKLC MCM Scholarship. Nirmesh Malviya, Nitish Srivastava, Kumar Ritikesh have been conferred the prestigious Aditya Birla Scholarship.

Sunil Kumar and G. Srivardhan (CHE) received Ambuja’s Young Researcher’s Award for pursuing postgraduation in chemical engineering after GATE. A. Shahin (CHE) was awarded the first prize for poster presentation at the Fifth
Rheology of complex fluids Symposium, IIT Madras. C. S. Sharma (CHE) was given the best poster award at the International Symposium of Hydrogen and Energy Storage, held under the aegis of the Energy Conclave 2010. K. Seethalekshmi, Ph.D. student (EE) has been selected for the 2010 Clayton Griffin Student Paper Award at the Georgia Tech Protective Relaying Conference. A. K. Dey (Maths & Stats) was awarded the Young Scientists Award (Statistics Section) of Indian Science Congress-2009. Debjit Datta and Anirban Bagui (EE) bagged the best poster award in Photovoltaic section: *Ellipsometric studies on CuPc/C60 heterojunction for solar cell applications*, in International Workshop on Physics of Semiconductor Devices (IWPSD) - 2009, New Delhi. Soumitro Mahanty, Ph. D. student (MME), also won the best poster award in the Materials Science category for *Electron Microscopy Study on the Surface Modification of Al-SiCP MMC after Pulsed Laser Irradiation*, at the International Conference on Advances in Electron Microscopy and Related Techniques and XXXI Annual Meeting of EMSI, BARC, Mumbai. Priyanka Dash’s M.Tech. thesis (MME) entitled *Effect of Sintering Temperature on Microstructural Evolution and Tribological Properties of Cu-Pb Alloys* was awarded the Professor B.D. Upadhyaya Memorial Gold Medal in Physical Metallurgy & Materials Processing (2009).
Prof. P. K. Bharadwaj (Chemistry) has been conferred the prestigious J. C. Bose fellowship. Prof. V. Chandrasekhar (Chemistry) has been elected to the Academy of the Developing World, FTWAS, Trieste, Italy. Dr. Balaji Prakash (BSBE) has been awarded the DBT - National Bioscience Award for 2009. Dr. Anupam Pal (BSBE) was chosen for the Young Investigator Award by Asian Neurogastroenterology and Motility Association, 2009. Prof. Manindra Agrawal (CSE) has been selected for Rajib Goyal Prize for young scientists in physical sciences. Dr. S. N. Tripathi (CE) has been selected for the NASI - Scopus Young Scientist Award (2009) in the area of Earth Sciences. Dr. Ashu Jain (CE) received the Endeavour Executive Award 2009 of the Ministry of Education, Australia. Dr. Yogesh M Joshi (CHE) received the Amar Dye Chem Award for 2009. Drs. Jayant K. Singh (CHE), Surender Baswana (CSE), and Tarun Gupta (CE) received the INAE Young Engineer Award for 2009. Prof. D. Kunzru (CHE) has been elected a Fellow of The National Academy of Sciences, India. Prof. S. K. Gupta (CHE) has been elected a Fellow of the Indian National Academy of Engineering, New Delhi. Prof. R. R. K. Sharma (IME) has been awarded the Outstanding Management Researcher Award. Dr. Krishanu Biswas (MME) has been chosen for the INSA Young Scientist Medal 2010. Dr. Anish Upadhyaya (MME) has been selected for the 2009 Metallurgist of the Year Award.
Prof. R Balasubramaniam (MME) has been chosen to receive the inaugural IIM Distinguished Educator Award for 2009. Dr. Sameer Khandekar (ME) has been awarded the Prof. K. N. Seetharamu Medal for Young Researchers by the Indian Society for Heat and Mass Transfer. Dr. Shantanu Bhattacharya (ME) has been chosen for the IEI Young Engineers Award 2009-10. Dr. Sudeep Bhattacharjee (Physics) has been chosen for the Buti Foundation Award in the field of Plasma Science and Technology for the year 2009.

RESEARCH & DEVELOPMENT

Over the past years, the Institute has proactively embarked on collaborative-oriented R&D projects involving joint participation of industries, R&D labs and government organizations. The research profile of the Institute is continually growing every year. As a result, the Institute is well-recognized as one of the centers of academic excellence.

During 2009-2010, 133 sponsored projects worth Rs. 69.5 crore and 100 consultancy projects of value Rs. 7.5 crore were undertaken by the faculty and research engineers/scientists of the Institute, respectively.

The Institute has filed over 20 patents during the last year. Also, 5 inventions have been accepted by Intellectual
Ventures for patenting and commercialization. The Institute has signed several Memoranda of Understanding with Indian as well as international academic/research institutions and industries to strengthen its collaborative research initiative. Some of the organizations include: Bhabha Atomic Research Center, Chevron, Vikram Sarabhai Space Center, Indira Gandhi Centre for Atomic Research, Indian Space Research Organization, Gas Authority of India Limited, and United Nations Development Program.

As part of National Knowledge Network that envisages better mentoring of the new IITs by the established ones, an MoU has been signed with the National Informatics Center Services Incorporated (NICSII) and National Informatics Center (NIC). Three virtual classrooms shall be set up at the Institute. Lectures would be delivered enabling two-way interactions using this infrastructure.

**High Performance Computing (HPC) facility**

Computational Science and Engineering has undergone revolutionary changes over the past two decades. HPCs have brought about a paradigm shift in the very nature of scientific investigations in the global scenario. Although, India is recognized as one of the leaders in information technology, its capacity for High Performance Computing falls below the
optimum level. IIT Kanpur has had a long tradition of computer-aided teaching and research. It aspires to provide leadership in HPC via a two-pronged approach. The Institute would like to carry out cutting edge research in computational science and engineering by utilizing the best-in-class HPC hardware and tools. Nevertheless, it is committed to preparing high quality human resource for the rest of the nation. This requires a constant modernization of the HPC facility.

The Institute is in the process of upgrading its HPC infrastructure to a state-of-the-art facility with generous support from the DST. The main HPC system will be a Linux cluster with a master node, 3 management nodes and 256 compute nodes, 40 Gbps QDR infiniband interconnect and 100TB usable storage. Each node will have dual Nehalem quadcore processors. Besides this main system, the Center will have smaller clusters and servers for developing and testing parallel codes. These systems will also be available for applications not amenable to parallelism and which require serial computing. The smaller systems will be integrated with the main HPC facility for optimizing it, including its storage and high-speed network. This integrated facility consisting of 372 nodes and a projected delivered performance of about 30 TF is expected to be the best HPC facility, among all academic institutions in the country.
The HPC facility is expected to provide a major boost to our research in computational science and engineering. The Centre will help train new generation of scientists and engineers in advanced computing, develop sharable application software for parallel platforms and motivate young minds to take up challenging problems in computation. The facility will provide the much needed opportunity to attempt grand challenging problems in science and engineering. Some examples are computational fluid dynamics, environmental modeling, ab initio molecular modeling of chemical processes, biomechanics. Broadly, the research effort of the facility can be classified under three categories: (a) Computational mechanics, (b) Computational materials science, and (c) Computational chemistry and biology. It is envisaged that the facility will throw open newer research areas as it develops. The contributions will be from researchers from both within and outside IIT Kanpur. Inter-disciplinary and inter-institutional research using cutting edge computational technologies will be strongly encouraged. To be supplied by Hewlett-Packard, HPC is scheduled to arrive on campus in
June. Once the HPC arrives, IITK will find a place in the TOP 500 HPC list with its rank at 369.

The project *India-UK Advanced Technology Center (IU-ATC) of Excellence in Next Generation Network Systems and Services* seeks to study the feasibility of transmitting high data-rates through frequency selective fading channels. To this end, Orthogonal Frequency Division Multiplexing (OFDM) would be employed to combat the effects of fading and Inter Symbol Interference (ISI). The other issues that would be addressed are the reduction of the peak-to-average power ratio (PAPR), improving the reliability of transmission using turbo-coding and synchronization. The novelty of this project lies in developing the transmitter and receiver algorithms in discrete-time.

The biometric group of the Institute is working towards developing an indigenous multimodal biometric system. Accordingly the system fuses five biometric traits viz. Face, Fingerprint, Ear, Signature and Iris and works well under controlled environment. Currently, the group is engaged with a DIT funded project titled
Biometric System Development to build upon the existing system by minimizing its limitations and by incorporating some new traits. Further, it is developing a face recognition system which can work for the non-digital face images.

The Project titled Engineering Articular Cartilage: A Novel Interdisciplinary Approach is funded by DBT. Osteo-arthritis (OA) is the most prevalent disease in India affecting more than 65% of the elderly (60 years and above) population and has no cure. Since OA is a degenerative disease of a tissue called articular cartilage which is vascular, drug delivery as a treatment option is not viable for this disease. The most attractive remedial approach seems to be tissue engineering of articular cartilage in the laboratory from stem cells of patients and implanting that engineered tissue on to the patient. To achieve this, we need to precisely understand the etiology of this tissue which is unique developmentally, chemically and responsive to mechanical forces/stimuli. Therefore, we are currently trying to investigate the exact genetic make-up of articular cartilage and the nature of mechanical forces this tissue experiences. We would eventually like to provide these extrinsic and intrinsic cues to stem cells impregnated in an engineered biomaterial mimicking natural chemical environment of articular cartilage.
The attractive feature of the DBT funded project *Investigation on developing Ultrahigh Molecular Weight Polyethylene-Hydroxyapatite – Carbon Nanotube Biocomposite for Biomedical Applications* lies in applying a synergistic combination of (i) Hydroxyapatite (HA, Ca$_{10}$ (PO$_4$)$_6$(OH)$_2$), (ii) aluminum oxide (Al$_2$O$_3$) and (iii) carbon nanotubes via compression molding and achieving enhanced mechanical and tribological properties of the biocomposite without deteriorating its cytocompatibility.

A prototype of the acetabular cup and ball joint is prepared via Z-printing (Figure 1), and compression molding of a whole hip-joint of newly developed UHMWPE-HA-Al$_2$O$_3$-CNT is envisaged. Further, a combination of UHMWPE and HA coating on a real-life Ti-6Al-4V body implant is also being researched using electrostatic spraying (Figure 2).

![Prototype of Hip Ball and socket joint](image1.jpg)

**Figure 1**: Prototype of Hip Ball and socket joint, which will be replaced by UHMWPE-HA-Al$_2$O$_3$-CNT biocomposite after animal studies and clinical trials.

![UHMWPE-HA coated Ti alloy](image2.jpg)

**Figure 2**: Electrostatic spraying (ESS) coating of UHMWPE-HA on a real-life body implant material Ti-6Al-4V substrate. This coating is expected to provide enhanced tribological properties.
The project funded by the Ministry of Earth Sciences envisages the use of an integrated approach for understanding river dynamics and flood risk evaluation of the Kosi river in north Bihar. The river created havoc last year when a large scale (~120 km) avulsion took place following a breach in the eastern afflux bund at Kusaha in Nepal. This resulted in inundation of very large areas. This project aims to investigate the causative factors of frequent avulsion in the Kosi river using geomorphological approaches for developing a process-based understanding of avulsion and flooding coupled with hydraulic and mathematical modeling. Modern approaches such as high-resolution remote sensing data and kinematic GPS based topographic mapping will be employed to generate geomorphic evaluation of the terrain and to understand the avulsion mechanisms and controlling factors. Results of this project would lead to developing plans for an integrated flood management programme in this region.

This project on High Lift Aerodynamics seeks to enhance understanding of high lift flow physics and to obtain highly accurate and detailed measurements for two-dimensional high-lift geometry. Design of high lift systems is a challenging task both from the vantage of performance and noise
Fundamental understanding of the associated complex flow physics is essential for effective designing of high Lift Systems.

Development of a large format PIV system capable of interrogating an area of 1m × 1m is a challenging task for wind tunnel applications.

Fundamental understanding of the properties of the light sheet, imaging cameras, and their orientation relative to the light sheet is essential for the effective designing of a large format PIV system.

This project aims to develop a large format PIV system with advanced flow diagnostic capability. The system is to be used for flow past multi-element airfoil to understand high lift flow physics.
**Solar Energy Project**

The Institute has undertaken an ambitious project to setup a 500 kW *Solar Energy Research Experimental Station (SERES)* near Shivli road. It will supply power to nearby villages at subsidized rates. The project is first of its kind, since it has technology as well as social dimensions.

A *liver support system* is being developed in the Department of Biological Sciences and Bioengineering in association with GB Pant hospital, New Delhi. And this system which can be hung outside the body like a glucose bottle performs all the functions of a normal liver, while giving the ailing organ the much needed rest for it to recuperate. The device has been tested successfully in a laboratory in Japan.

Several projects such as *Benchmarking of information and communication technology modules in physics and chemistry*; *Development of open source LMS with ERP functions*; *National Mission on education through Information & Communication Technology "Virtual Labs" - Internet Based Laboratories*; *National Mission on education through Information & Communication Technology - proposal pertaining to Virtual Technical university concepts*; *Quantum and Nano Computing Virtual system*; and *National program of technology enhanced learning (Phase II)* are funded by the MHRD during this year.
New RA hostel construction
The ground-breaking ceremony of the extension of new RA hostel has already been completed. The proposed building on seven floors will have 200 single and 36 double rooms for research associates, senior scientists and post-doctoral fellows, apart from office spaces.

Multi-storied residential flats for faculty
The construction work on multi-storied residential flats for faculty has started near the Health Center. There will be 2 buildings (ground + 6 floors) with 48 flats.
**Time Capsule**

As part of the Golden Jubilee celebrations, a time capsule was lowered down by Her Excellency the President of India, Shrimati Pratibha Devi Singh Patil in early March. The contents of the time capsule include an aerial map of the Institute, the Institute seal, Silver Jubilee logo, Golden Jubilee logo engraved in silver, copy of Statutes, Ordinances and Acts, minutes of the first and hundredth Senate meetings and the Board meeting, Institute Annual Reports for 1961-62, 1984-85, 2008-09, DRPG Annual Report, photographs of over 50 years, R&D chapter from IITK history book, list of R&D projects, R&D publications, information on birds spotted on the campus, students gymkhana, typical weekly menu of a hostel mess, courses of study, academic program chapter (UG and PG), information about non-academic activities of student life, copy of degree certificates, replica of the President’s Gold
Medal, DVD of *Sharing A Dream – Indian Institute of Technology – The First fifty years,* oral records of the interviews conducted by Mr. Sunil Shanbag and the IITK movie 2009, Institute blazer crest, replica of the scroll signed by Mr. Narayana Murthy during the Golden Jubilee inauguration. The event was unique in our academic context and created a great deal of excitement in the campus community.

**Highlights from Departments**

The Department of Aerospace Engineering has established a new experimental laboratory with funding from DST for the design, development and testing of autonomous mini helicopter. The Department of Electrical Engineering is developing a new lab for the microwave imaging and material testing. Helium liquefier facility was inaugurated in the Department of Physics from a five-crore project funded largely by DST under the FIST Scheme.

The Department of Biological Sciences and Bioengineering developed a neo-cartilage for osteoarthritis; stem cell separation technology using supermacroporous cryogels (process and product ready for commercialization); Bio-artificial Lever Support using Cryogel bioreactor (preclinical testing); cigarette filter accessory using supermacroporous
cryogel (process and product under commercial development); metal chelate affinity precipitation for protein separation; disposable cryogel bioreactor for the production of therapeutics; cryogel filter for the depletion of leukocytes from blood; antiseptic wound dressing bandage using PVP-I macroporous sheet; and polymeric macroporous scaffolds for skin tissue engineering. The Department also developed the software for a four-dimensional reconstruction and characterization system for biomedical images.

The Department of Civil Engineering developed 15 LPM PM2.5 air sampler. The Department of Chemical Engineering developed an organic semiconductor based flexible temperature sensor; white light emitting lanthanide-doped nanomaterials for solid-state light applications; and Nanoparticles-loaded nano/micro polymer capsules for bioimaging and drug delivery applications. The Department also developed the software tool for design of small interfering RNA. The Department of Chemistry developed a fast method to count and quantitate bacteria; drug free polymer nanocoatings on coronary stents — product and process development; low cost nano carbon based water filter for drinking water (now been under field trial). The Department also developed the software constraint density functional theory codes for ab initio molecular dynamics code.
CPMD. The Department of Electrical Engineering developed Brihaspati-2: SCORM packager and SCORM runtime. The Department of Physics developed a novel focused ion beam system capable of generating multielement focused ion beams (ME-FIB).

The Department of Mechanical Engineering developed a pipe crawling robot with a novel Smart sensor; Power-pro – a novel energy harvesting device for low-power electronic systems and an Active Infusion Pump jointly with the Design Program; 2-D Solar Tracker was developed as a PTB; MEMS based bacterial counter, Autonomous Vehicle Technology; double-sided incremental forming machine (under development); bi-level multi-objective optimization algorithm; and Multi-modal optimization using multi-objective optimization. The Department also developed the software for new damage detection for Composite Laminate using Damage Indexing; LES Solver for Turbomachinery Application (LES-TURBO); and tool path planning for Multistage Single Point Incremental Forming (further work in progress).

Some of the major sponsored projects undertaken by the Institute include those funded by BRNS, DRDO, NRB, DAE, DST, DBT, and DIT. Some of these projects are:
i. Combustion, material compatibility and engine tribology investigation in a biodiesel fuelled turbo-charged transportation engine (DST);

ii. Design, simulation and characterization of pneumatic spray nozzle (BRNS);

iii. Synthesis and measurement of third order optical nonlinearity of organic and organometallic compounds (DRDO);

iv. Development of corrosion and wear resistant NI and AL-based metallic glass coatings and nanocrystalline coatings (NRB);

v. Nano-clusters through laser ablation in liquid (DRDO);

vi. Bimetallic catalysis involving ruthenium and palladium: C-H bond activation, functionalization and beyond (IFCPAR);

vii. Zero Discharge Toilet System (ZDTS) (URBAN);

viii. Powder Metallurgical (PM) processing of tungsten and tungsten-based alloys for iter-like divertor components (DAE);

ix. Sintering, properties and *in vitro* characterization of hydroxyapatite-titanium composites (DBT).

A few major consultancy projects received last year include:

i. BOF process automation at VSP (VSP);

ii. Qualcomm-IITK research project (Qualcomm);
iii. Active fault mapping along South Wagad and Gedi fault in eastern part of Kachchh, Gujarat (GSDMA);
iv. MEMS Based Wireless Ultra-Portable Track Monitoring System (RDSO).

RESEARCH INFRASTRUCTURE DEVELOPMENT

The Institute is adding several major infrastructural facilities for carrying out multidisciplinary R&D activities. For development of a Micro-fabrication laboratory, partial funding has been obtained under the CARE scheme. Under CARE, a (Circular Dichroism) CD-spectrometer facility, Integration of excimer laser with the existing microbeam facility, establishment of a multipurpose ultra-centrifugation facility, high temperature electrochemical test station, and Dielectric probe kit for determination of electromagnetic properties over a wide band of frequencies have been funded.

Major equipment funded by the Institute include X-ray fluorescence spectrometer, Laser-induced incandescence for real-time particulate emissions measurement, measurement facility for flight of insects and birds and in general, for low Reynolds number flows, I (intensified) - CCD camera for a laser induced fluorescence spectroscopy facility, Femtosecond laser spectroscopy setup, Fluoroscence microscope attached
with Digital bacteria colony counter, Instrumented indentation unit, and Table top scanning electron microscope.

**INTERNATIONAL COLLABORATIONS**

The Institute has entered into MoUs with Chevron U.S.A. Inc., USA, European Aeronautic Defence and Space Company, France, IHI Corporation, Japan, Protista Biotechnology AB, Lund, Sweden, Qualcomm Incorporated, USA, Corus Technology BV, The Netherlands, University of Tokyo, Japan, University of Miyazaki, Japan, Mazardaran University of Science & Technology, Iran, The University of Texas At San Antonio (UTSA), Texas, and Pratt & Whitney Canada Corporation, Canada.

The objectives of these MoUs consist in promoting, strengthening, maintaining scientific and academic co-operation, exchange of faculty, students, staff, technology transfer, sharing of intellectual property for the purposes of engineering research and educational programs, sharing scientific instruments of common interest.

The Government of Malaysia is creating a Centre of Engineering Excellence at Penang with Universiti Sains Malasia (USM) and IIT Kanpur as partners. The goal of the Centre is to provide consultancy services to the multinational companies
in the Penang area. In addition, the centre will organize short term courses and training programs for the engineers of the local industry. A Malaysian financial institution, *Khazanah* will provide the initial funding for infrastructure including the buildings. It will also provide funding for shared services like equipment and software.

The Institute has also signed a Memorandum of Understanding with the University of Texas at San Antonio for exchange of faculty and staff to participate in a variety of teaching and/or research activities and professional development; exchange of graduate students for study and/or research; organize symposia, conferences, short courses and meetings on research issues; carry out joint research and continuing education programs; and exchange information pertaining to developments in teaching, student development, and research.

The Intel Higher Education Program is a worldwide collaboration between Intel and more than 150 universities in 34 countries. In India, this program will collaborate with IIT Kanpur to form the first Focus School for Intel in India. This programme seeks to encourage academia-industry collaboration and to support the development of a higher educational ecosystem.
FINANCIAL RESOURCE MOBILIZATION

The Institute has had a satisfactory financial year during 2009-10. The total Grant-in-aid received during the financial year from MHRD, Govt. of India, under non-plan was Rs 138.55 crore, under Normal Plan Rs 35.00 crore and Rs. 67.00 crore under plan (OSC), respectively.

The financial year 2009-10 has been reasonably good for fund raising at IIT Kanpur. As economy slowed down globally, fewer individuals and organizations came forward to donate to the Institute. The Institute received Rs 4.13 crore from 805 donors. This is about 6% lower compared to the previous year. The Institute is devising new programs to augment the donations and the number of donors.

A total of 481 donors contributed about Rs 42 lakhs under the Annual Gift Program. Donations received under AGP have been utilized for providing travel support to the students and faculty for attending international conferences, cash award to students for publication of their research papers in reputed journals, travel support to international visiting faculty, filing of patents and other similar activities supporting and encouraging excellence in the Institute.

Indian Oil Corporation has established an Indian Oil Golden Jubilee Chair of Petroleum Technology in the Institute to
support research work in Hydrocarbon sector. They have created an endowment of Rs 40 lakh to support the Chair professorship. Dr. D. S. Hur, CEO of GS Caltex has created two young faculty Research Fellowships to honor Mr. Jeet S Bindra (Ex-President Chevron Global and BT/ChE/1968), a distinguished alumnus of IIT Kanpur. State Bank of India has offered to create an endowed Chair in the area of Environment and Energy at the Institute.

Chevron Corporation (courtesy Mr. Jagjeet Singh Bindra) has created a Foundation to support various activities in the Institute including creation of a Centre for Development of Soft Skills, and a Foundation for the Department of Chemical Engineering in the Institute. They have also donated liberally to support student research magazine _NERD_.

The Institute has been encouraging research by providing travel support to students and faculty members, rewarding students for publishing research papers in high quality journals, recognizing outstanding faculty members by providing chairs and fellowships, supporting registration of patents, awarding summer internships and supporting schools on campus. These activities are being supported by alumni donations.
The endowment continues to bring good returns on investment. During the financial year 2009-10, despite the low rate of interest on investments given by the banks and financial institutions, the donor accounts have earned 9% annual interest.

There exists an enormous potential for actively engaging our alumni. The challenge ahead of us is to sensitize all the segments of the institute about alumni engagement and fund raising. Without a supportive environment at the grassroots level within the Institute, it may be difficult at times for our alumni and well-wishers to support us. The Institute needs to create a substantial demand for donor funds, for the alumni to respond enthusiastically.

**STUDENTS’ ACTIVITIES**

IIT Kanpur continually strives to encourage an equitable balance between academics and extra-curricular activities among its students. Our vision is to create future leaders in their chosen fields and not just technically accomplished individuals. The Institute strongly believes that an abiding social and humane engagement is the hallmark of its student body. To translate such a belief into reality, the Institute nurtures social, cultural and sporting activities pursued by the students’ gymkhana and other student groups.
**Glucoband**

Diabetes mellitus is a chronic metabolic disorder caused by defects in insulin secretion which results in hyperglycemia. About 6% of the world population is afflicted with this disease and this number is expected to increase. An interdisciplinary student research group of about 17 members has been formed to develop a closed loop glucose sensing and insulin delivery system. This device, named *Glucoband*, the schematic of which is given below, is a band to be worn around the shoulder, needs minimal user interference, causes minimal pain, and delivers insulin in a controlled amount. It is expected to counter the growing diabetic situation in the country and worldwide.

The band will have the following features:
1. Glucose sensing using micro cantilever based sensing mechanism,
2. Microneedle for extraction of blood to cause minimal pain,
3. Membrane deflection based piezoelectric micropump,
4. Insulin delivery system (incorporated with insulin reservoir) using microneedles,
5. Micro-controllers to couple the detector with the delivery system.
Conducted in the Centre for Environmental Science and Engineering, this student-driven project is scheduled for three years.

**Lunar Rover**

The Lunar rover is expected to navigate on very rough terrain. The main focus of the two projects is on wheel traction control and accurate 3D map generation. To experimentally evaluate the interaction between a rover wheel and soft soil, a test set up has been developed (Fig.1). In this setup the wheel and the body of the rover can be driven at different speeds and the resultant effect on traction studied. Kinematic analysis of a prototype lunar rover consisting of 6 wheels with a total of 10 degrees of freedom has also been completed and a CAD model developed using ADAMS software (Fig. 2). The rover is currently being fabricated by an industrial source.
Algorithm development for a lunar rover is actively progressing where a line laser mounted mobile platform has been developed (Figure 3). Using the reflected laser light, the algorithm can determine the free space (white) and the obstacle space (red) in front (Figure 4). Based on the free space, an optimal path planning algorithm will be developed for moving the rover to a desired point.
**Jugnu**

It is the first nanosatellite developed by students under the guidance of faculty of the Institute and scientists from ISRO. And it has already been handed over to ISRO. The mission hopes to serve the nation by providing indigenous miniaturized technologies for future space missions. Moreover, it aims to provide real life design and development experience of actual space systems to students. *Jugnu* will transmit a *Beacon* – blinking signal, at all times – all over the earth. Amateur frequency bands will be used for communication so that the Beacon can be tracked by amateur HAM community anywhere in the World.

**IIT Kanpur Boeing Collaborative Undergraduate Research Project**

*Abhyast* is a mobile robot device designed to be reliable and rugged for map interpretation, robotic navigation, and imaging. It navigates with the help of GPS (Global Positioning System), IMU and Digital Compass (direction). The robot communicates with the user through GSM network which brings in the added benefit of large areas of network coverage. The autonomous navigation system is enabled through self-localization and path planning capabilities. As such, the commanded paths are susceptible to obstacles—both static and dynamic. The navigation system in *Abhyast* is able
to detect obstacles along the commanded path and steer the vehicle to avoid these. Since this vehicle takes images of the target location, it makes possible vast application areas in monitoring of remote areas.

The following capabilities are inbuilt into the vehicle.

1) Accepts the co-ordinates (latitude, longitude or name) of its destination from GSM network (e.g. BSNL, Idea, etc.).
2) Finds the shortest path to its destination by processing a pre-stored open street map of the region.
3) Navigates autonomously using obstacle detection and collision-avoidance techniques to the destination using IMU assisted GPS, Digital compass and Laser Scanner.
4) Takes images in the vicinity of the destination point.

The following diagram summarizes the intended capability of the vehicle.
Phase II of this project is currently underway in which three fold tasks are planned. A new team of 16 undergraduate students are currently working to accomplish these activities.

The tasks for phase II are the following:
(a) Optimization algorithms or the on board computer with respect to path and time planning and power management.
(b) Inclusion of On board health management and increasing the level of communication of the existing on board computer for multi agent problems.
(c) Design and development of a gas sensor for environment reading and monitoring in chemically hostile environments. (i.e., inter vehicle communication in a swarm of such vehicles).

A table top Pin-on-Disc (POD) machine has been developed by students of Mechanical Engineering that measures online, the co-efficient of friction and wear volume between two similar/dissimilar contacting surfaces. The next in the series is a palm-top micro electric discharge machine (m-EDM). This set up has adjustments that are coarse (upto a few microns) and fine (upto a few nanometers). The entire set-up operates at 0.1 mJ to 1 joule energy. The device aims at machining and micro deposition at micro connections in a PCB.
A variety of activities are pursued by various clubs coming under the broad ambit of the councils of the Gymkhana. They range from clubs like Prayas, where students teach children coming from socially disadvantaged and economically deprived backgrounds to the Dramatics club which stages thematically inspired and socially relevant plays. Other technically oriented student groups are engaged throughout the year in pursuing special interests like robotics, electronic aids, animation, aero-modeling, dance, fine arts, and astronomy to name but a few.

The overriding objective of the large-scale events of the Institute such as Antaragni, Techkriti, Udghosh and Megabucks is to infuse a sense of richness and purpose in the lives of students. Antaragni is the cultural festival. Techkriti is the science and technology festival. Udgosh is the sports festival. Megabuck is a festival to promote the spirit of innovation and incubation. All these social, cultural and sporting activities play a crucial role in the transformation of a student into a complete human being. These festivals have seen vastly improved participation levels, both from within the Institute and also from students from other national and international institutions. The revenues generated for conducting these festivals saw an impressive growth last year, which is a tribute to the managerial and logistic skills of our...
students. During the year, a total of 20 talks were held which include 6 TaLeS talks, 2 talks held in Takneek, 1 seminar and 2 weekly discussion sessions.

New indoor sports complex was also inaugurated during the Inter IIT Sports Met. IIT Kanpur stood third in boys’ category and second in girls’ category. The Institute team visited BITS Pilani to participate in the sports festival; our chess team won the gold medal, our TT team won the silver, and in volleyball, TT (girls), and badminton (boys) IITK emerged as semi-finalists.

The Institute witnessed stiff inter-hall competition in the form of Galaxy and Varchasva, inter-hall cultural and sports championships respectively. Fresher Varchasva tournament also had been organized to find some new talent from the incoming batch. The sole guiding principle to organize these championships is to provide the students of this campus, a much needed platform to compete and showcase their cultural and sports talents and to give them a reason and a motivation, strong enough, to come out of their rooms and participate in group activities.

The Student Counseling Service is the most active wing of our students. The activities include organizing the orientation
programme for UG as well as PG students; providing specific attention to students having academic, financial or personal problems; monitoring the progress of students who need special attention. It enjoys wide appreciation from both faculty and students.

Owing to the economic downturn, the placement scenario this year was not as encouraging as the previous years but was certainly good when compared with some of the other IITs and other professional engineering colleges. Out of the 1400 public and private organizations invited for recruitment, 140 companies have finally conducted their interviews and the overall placement figure for the year stands at 79.6%. Despite the market crash, an extended effort that included a slew of new initiatives in terms of association with alumni and spreading career awareness led to 41 new companies reporting for placement this year. The relationships formed with the alumni and other prominent people in the industry, besides the different channels explored this year for recruitment, will definitely help the placement scenario of the campus in the years to come.

The Institute has put in place the entire infrastructure necessary to meet the requirements of the enhanced student strength. As of now, there are eleven halls of residence, nine
for boys and two for girls. The total capacity in these halls is above four thousand.


IIT Kanpur is celebrating its Golden Jubilee during August 2009 to December 2010. A number of academic and cultural events have taken place. The celebrations started with the inaugural event during August 8-9. The chief guest Shri N. R. Narayana Murthy urged the Institute to chart out a path to become one of the best universities in the world in the next 20 years. *Sharing a Dream*, a documentary on IIT Kanpur made by Mr. Sunil Shanbagh, was premiered during the event. The event also featured a workshop on *Challenges in Higher Education* with a number of distinguished speakers, including Mr. Sam Pitroda, Mr. Arun Shourie, and Dr. M. Anandakrishnan giving their views on the current higher education scenario in the country.

The main celebratory event was the visit of the President of India, Smt. Pratibha Devisingh Patil, on 5 March 2010. During her visit, she handed over the nano satellite *Jugnu*, designed and fabricated by students of the Institute, to ISRO for launch over the next few months. She also buried a time capsule that records the history of the Institute. The time capsule was also
designed and fabricated at the Institute. The President also inaugurated a photo exhibition on the Institute.

Five major Golden Jubilee conferences were planned, of which four (Symposium on Fabrication at Small Scale; The Energy Conclave; Interaction, Instability, Transport and Kinetics: Glassiness and Jamming; and Conference on Environmental Health and Technology) have already been held and one on Molecules and Supramolecules will be held in October this year. A year-long Golden Jubilee Seminar Series is underway in which many distinguished speakers, including Mr. Pratap Bhanu Mehta (noted commentator on Indian policy), Prof. Jean-Marie Lehn (Nobel Prize winner in Chemistry), Prof. Douglas Osheroff (Nobel Prize winner in Physics), Mr. Michel Danino (expert on ancient Indian civilization), and Prof. Partha Pratim Majumdar (expert on Genomics) have addressed a large gathering.

Alumni of the Institute are also involved in the Golden Jubilee activities. An alumni convention was held during January 2-4 where the top 50 alumni of the institute were identified (through voting) and honored. This was followed by a convention in Bangalore in June with its focus on innovation. Now we have two more conventions coming soon: first one in Washington DC during July 9-11 to honor universities which
participated under KIAP and the second one in Santa Clara during July 16-18 with a focus on rejuvenation.

A number of cultural and sports events were also held on campus. Prominent ones are: 50 km run, Bicycle tour, performances by Shubha Mudgal, Pandit Hari Prasad Chaurasia, Astaad Deboo, and Malini Awasthi, among others. The Golden Jubilee celebrations covering a wide spectrum of academic and cultural events have truly nourished the soul of the Institute.

**CLOSING REMARKS**

Dear graduates, on this occasion of the forty-second convocation, I extend my heartiest congratulations and best wishes to the Class of 2010 passing out today. This hard-earned success is a major milestone in your career. And I also take this opportunity to salute your parents, the true miracle makers, who have quietly ensured your success and glory in all that you have chosen to do.

Convocation is a memorable event for every academic institute that values excellence and nurtures the spirit of adventure in its students for them to succeed in their journey of discovering the world and the self. With its mantra of teaching, research and innovation, IIT Kanpur has bestowed
on you valuable knowledge as well as a unique value system. There are several paths ahead teeming with endless opportunities. The more you learn, the less you think you know. You are entering the real world, and the opportunity beckons you to use your knowledge of science and technology in the service of the society.

We all fervently hope that you would excel in your professional career. It is time for you to get ready to face a globally competitive world. Wherever you are, we will always be happy and proud to hear about your accomplishments in life.

Dear Graduate of 2010, I admire you for your fine accomplishments during your stay at IIT Kanpur. Given your intellectual attainments and breadth of understanding, you are destined to bring cheer, hope, joy and luck in all the lives you touch. Each of you in your own way has internalized the spirit of IIT Kanpur that privileges commitment, excellence, fellowship, and, importantly, service. No matter where you are and what your vicissitudes, never stop dreaming! “If in dreams begin responsibilities” as the poet says, then inability to dream would mean lack of engagement with responsibilities. Therefore, be a practical dreamer and see that in your lifetime you change this world a little bit. My
sincere, good wishes for the productive work you aspire to do in the future.

Jai Hind.
Awards and Honors

Fellowship
1. Dr. S. N. Tripathi (CE) received the NASA Senior Fellowship, National Aeronautics and Space Administration, USA.
2. Prof. Deepak Kunzru (CHE) has been elected Fellow, The National Academy of Sciences, India.
3. Prof. S.K. Gupta (CHE) has been elected Fellow, Indian National Academy of Engineering, New Delhi.
4. Prof. P. K. Bharadwaj (CHM) received the J. C. Bose National Fellowship, DST, New Delhi, India.
5. Prof. J. N. Moorthy (CHM) has been elected Fellow of the Indian Academy of Sciences (FASc), Bangalore.
6. Prof. S. Verma (CHM) has been elected Fellow of National Academy of Sciences, India.
7. Prof. Y. D. Vankar (CHM) has been elected Fellow, Indian National Science Academy, New Delhi, 2009.
8. Dr. Braj Bhushan (HSS) received the Common Future Fellowship (2010), Volkswagen Stiftung, Germany.

Awards and Medals
1. Dr. Anupam Pal (BSBE) was conferred the Young Investigator Award by Asian Neurogastroenterology and Motility Association, 2009.
2. Dr. Balaji Prakash (BSBE) has been awarded the DBT-National Bioscience Award for 2009.

3. Dr. Ashu Jain (CE) has been awarded Endeavour Executive Award 2009 by the Ministry of Education, Australia.

4. Dr. Tarun Gupta (CE) received the INAE Young Engineer Award (2009).

5. Dr. Tarun Gupta (CE) received the INDO-US Frontiers of Science Symposium Joint Research Award (2009).

6. Prof. Rajiv Sinha (CE) has received the best paper award from the Indian Society of Remote Sensing (2009).

7. Dr. S. N. Tripathi (CE) has been given the NASI-Scopus Young Scientist 2009 Award instituted by the National Academy of Sciences India and Elsevier Pvt. Ltd. Asia-Pacific.

8. Prof. Ashutosh Sharma (CHE) received the Homi J. Bhabha Award for Applied Sciences, University Grants Commission (UGC) and National Hari Om Ashram Trust Award for the year 2007 [received in 2010].

9. Dr. Y. M. Joshi (CHE) received the Amar Dye Chem Award, Indian Institute of Chemical Engineers (IIChE).

10. Dr. J. K. Singh (CHE) received the Indian National Academy of Engineering (INAE) Young Engineer Award, 2009.
11. Prof. V. Chandrasekhar (CHM) has been elected to the Academy of the Developing World, FTWAS, Trieste, Italy.
12. Prof. J. N. Moorthy (CHM) received the bronze medal awarded by the Chemical Research Society of India (CRSI).
13. Dr. S. S. Manoharan (CHM) was conferred the Gold Medal of the DST - Lockheed Martin Innovation Growth Program for developing nanocoated coronary stent.
14. Prof. S. Verma (CHM) was conferred the CDRI Award for Excellence in Drug Research.
15. Prof. S. Verma (CHM) received the Rajib Goyal Young Scientist Prize in Chemistry.
16. Prof. Manindra Agrawal (CSE) received the G D Birla Award for Scientific Research, Birla Foundation.
17. Prof. Manindra Agrawal (CSE) received the P C Mahalanobis Birth Centenary Award, Indian Science Congress.
18. Prof. Manindra Agrawal (CSE) received the Rajib Goyal Prize, Kurukshetra University.
19. Dr. Surender Baswana (CSE) received the Young Engineer Award for the year 2009 instituted by the Indian National Academy of Engineers for his contribution to the field of design and analysis of algorithms.
20. Dr. Adrish Banerjee (EE) received the Young Engineer Award, Institute of Engineers (IEI), India in the area of Electronics & Communications, 2009.

21. Dr. Adrish Banerjee (EE) received the Microsoft Research India Outstanding Young Faculty Award, 2009.

22. Dr. Jaleel Akhtar’s (EE) paper entitled *Noninvasive Procedure for Measuring the Complex Permittivity of Resins, Catalysts, and Other Liquids Using a Partially Filled Rectangular Waveguide Structure* (IEEE Transactions on Microwave Theory and Techniques) received the CST (http://www.cst.com) University Publication Award 2009.

23. Prof. Ashok K. Mittal (IME) has been honored with Lifetime Achievement Award 2010.

24. Prof. R. R. K. Sharma (IME) has been judged the Outstanding Management Researcher, at AIMS-7 conference, at IIM Bangalore, India.

25. Prof. N. K. Sharma (IME) and Manu Kanchan’s paper *Role of mentoring in enhancing self efficacy: The effect of some personality traits and learning goal orientation as antecedents* has been judged the best paper at the Annual Global Conference on Entrepreneurship and Technology Innovation (AGCETI), 2010.
26. Prof. R. Balasubramaniam (MME) has been elected to receive the inaugural IIM Distinguished Educator Award 2009.

27. Dr. Kantesh Balani (MME) has been selected for the Young Scientists Award.

28. Dr. Kantesh Balani (MME) has been selected for Dr R L Thakur Memorial Award 2009.

29. Prof. Dipak Mazumdar (MME) has been selected to receive the G D Birla Gold Medal-2009.

30. Dr. Anish Upadhyaya (MME) has been selected for the 2009 Metallurgist of the Year Award.

31. Dr. Sameer Khandekar (ME) has been awarded the Prof. K. N. Seetharamu Medal for Young Researchers by the Indian Society for Heat and Mass Transfer.

32. Dr. Shantanu Bhattacharya (ME) has been chosen for the IEI Young Engineers Award 2009-10.

33. Dr. Shantanu Bhattacharya (ME) was given the Certificate of Outstanding Leadership by Boeing Corporation for the year 2009.

34. Dr Sudeep Bhattacharjee (Physics) was conferred the Buti Foundation Award and the Endeavour Research Award of the Australian Government.
EDITORSHIPS

1. Dr. D. P. Mishra, Associate Professor, Department of Aerospace Engineering, has been invited to serve as the main editor of 8th Eight Asia Pacific Conference on Combustion (ASPACC), scheduled during 10-13 December 2010 at Hyderabad.

2. Dr. D. P. Mishra, Associate Professor, Department of Aerospace Engineering, has been selected as Subject editor, International Journal of Hydrogen Energy, Elsevier Publisher, USA, 2009.

3. Dr. R. N. Mukherjee, Professor, Department of Chemistry, will be on the editorial board of Dalton Transactions, a journal published by the Royal Society, from 2010-11.

4. Edited book entitled *Macroporous Polymers: Production Properties and Biotechnological/Biomedical Applications* by Dr. Ashok Kumar, Associate Professor, Department of Biological Sciences & Bioengineering, was recently published by CRC Press-Taylor & Frances group. The book has two other co-editors from Sweden.

5. Dr. Ashok Kumar, Associate Professor, Department of Biological Sciences and Bioengineering, has been invited to join as Chief-Editor for Frontiers of Biotechnology and Bioengineering Journal.
6. International Review of Aerospace Engineering (IREASE) has selected Dr. E Rathakrishnan, Professor, Department of Aerospace Engineering, as Editor-in-Chief.

7. Dr. Kalyanmoy Deb, Professor Department of Mechanical Engineering, has been elected Associate Editor of the Applied Soft Computing Journal published by Elsevier.

8. Prof. V.K Jain, Professor, Department of Mechanical Engineering, has been appointed member of the Editorial Board of the International Journal of Manufacturing Technology Research published by Nova Science Publishers, New York (USA).

9. Dr. A. Sengupta, Emeritus Fellow in the Department of Mechanical Engineering, has been appointed Guest Editor of the International multidisciplinary journal on Nonlinear Analysis, Theory, Methods & Applications.

10. Dr. S. N. Tripathi, Associate Professor, Department of Civil Engineering, has been invited to join the editorial board of Indian Journal of Aerosol Science and Technology (IJAST) to be published by IAST.

11. Dr. Bikramjit Basu, Associate Professor, Department of Materials and Metallurgical Engineering, has recently been invited to join the Editorial board of International Journal of Biomaterials.
12. Dr. R. K. Dube, Professor, Department of Materials and Metallurgical Engineering, continues to be a member of the Editorial Board of the journal Powder Metallurgy, published by the Institute of Materials, Minerals and Mining, London.

13. Dr. D. Goswami, Associate Professor, Department of Chemistry, has been appointed Associate Editor, Global Journal of Analytical Chemistry, Simplex Academic Publishers, 2010.

14. Dr. B.V. Rathish Kumar, Professor, Department of Mathematics and Statistics, has been appointed to serve on the editorial Board of the International Academy of Physical Sciences.

15. Dr. Debasish Chowdhury, Professor, Department of Physics, has been invited to serve as Managing Editor of *International Journal of Modern Physics C: Computational Physics and Physical Computation*. This journal is published by World Scientific.

16. Dr. Amalendu Chandra, Professor, Department of Chemistry, has been invited to join the Editorial Board of Journal of Molecular Liquids. This journal is published by Elsevier.

17. Dr. D. P. Mishra, Associate Professor, Department of Aerospace Engineering, has been invited to join as Associate Editor for the Journal of Natural Gas Science.
and Engineering (Elsevier) for an initial period of three years.

18. Dr. Phalguni Gupta, Professor, Department of Computer Science and Engineering, has been appointed editor of Journal of Computers (JCP), published by Academy Publishers for 2 years.

19. Dr. Gautam Biswas, Professor, Department of Mechanical Engineering, has been elected member of the Editorial Board of Computational Thermal Sciences published by Begell House, USA.

20. Dr. Mohua Banerjee, Associate Professor, Department of Mathematics and Statistics, has been invited to join the Editorial Board of the Transactions on Rough Sets, a journal subline of the Springer Lecture Notes in Computer Science (LNCS).

21. Dr. Kalyanmoy Deb, Professor, Department of Mechanical Engineering, has been elected Associate Editor of the Applied Soft Computing Journal published by Elsevier.
Books Published


2. Macroporous Polymers: Production Properties and Biotechnological/Biomedical Applications. Ashok Kumar, Associate Professor, Department of Biological Sciences and Bioengineering. CRC Press-Taylor & Frances group, 2010.

3. Advanced Biomaterials: Fundamentals, Processing, and Applications. Bikramjit Basu, Associate Professor, Department of Materials and Metallurgical Engineering. Dhirendra S. Katti, Associate Professor, Department of Biological Sciences and Bioengineering. John Wiley & Sons, Inc., USA, 2009.


Avinash Kumar Agarwal, Associate Professor in the Department of Mechanical Engineering. SAE International, USA, 2009.


**Book Chapters**


3. *Biomaterial Application* in Advanced Biomaterials: Fundamentals, Processing and Applications. Kumar A., Associate Professor, Department of Biological Sciences and
4. *Cryogels as matrices for cell separations and cell cultivations* in Macroporous Polymeric Materials: Production, Properties and Biotechnological/ Biomedical applications. Kumar A., Associate Professor, Department of Biological Sciences and Bioengineering. CRC Press, Taylor & Francis Group, Boca Raton, USA, (2010).

5. *Macroporous Polymeric Scaffolds for Tissue Engineering Applications* in Macroporous Polymeric Materials: Production, Properties and Biotechnological/ Biomedical applications. Kumar A., Associate Professor, Department of Biological Sciences and Bioengineering. CRC Press, Taylor & Francis Group, Boca Raton, USA (2010).


8. *Multi-objective Genetic Algorithm and Simulated Annealing with the Jumping Gene Adaptations* in Multi-Objective


19. *A Digital Ecosystem Model for Competitive Agriculture, Knowledge Economy*. J. Chatterjee, Professor in the


29. *Why a cultural psychology of trauma reaction and healing: The case of Kachchh earthquake*, in Natural and man made disasters: Vulnerability, preparedness and mitigation (Vol. 2). Kumar Ravi Priya, Assistant Professor in the Department of Humanities and Social Sciences. MD Publications, New Delhi, 2010.

30. *India from Indira Gandhi's Emergency*, in Encyclopedia of Human Rights (Vol. 3). Munmun Jha, Associate Professor


32. Understanding Community Health Intervention in Culture, Cognition and Behaviour. Shikha Dixit, Professor in the Department of Humanities and Social Sciences. Concept, New Delhi, 2009.


43. *Corona and Related Ignition Systems*, in the Handbook of Combustion *Vol 5*, Wiley-VCH, Das, M.K., Assistant Professor in the Department of Mechanical Engineering.

