ANNUAL REPORT 2015-16

INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

IIT BOMBAY
ANNUAL REPORT
2015-2016

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Director's Report

The Indian Institute of Technology Bombay (IIT Bombay) has a rich tradition of pursuing excellence and has continually re-invented itself in terms of academic programmes and research areas. Students are exposed to challenging research-based academics and a host of sport, cultural and organizational activities on its vibrant campus. The presence of world-class research facilities, vigorous institute-industry collaborations, international exchange programmes, interdisciplinary research collaborations and industrial training opportunities help the students of IIT Bombay to excel and be ahead in the competitive professional environment.

I am pleased to state that the Institute continues to be ranked as one of the top universities of the country and among the best in the world. 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. For example, 49 out of top 50 rankers and 67 of top 100 rankers in JEE 2016 joined IIT Bombay this year. A similar trend is observed for the candidates qualifying in other entrance examinations as well.

IIT Bombay continuously strives to introduce new areas in its academic programmes and innovate in its academic activities, in a bid to generate the kind of intellectual capital that will keep the Institute and the nation up-to-date on the technological front. The year 2015-16 saw the introduction of a new 4-year undergraduate programme in design leading to a B.Des. degree, a new Executive MBA programme jointly run with Washington University at St. Louis and a new specialization 'Construction Technology and Management' for the M.Tech. programme in Civil Engineering.

With our theme 'Research that makes a difference', IIT Bombay has made concerted efforts to align its R&D focus with the national goal of achieving technological self-reliance. During last ten years, R&D receipts grew at a compound annual growth rate (CAGR) of over 37 per cent. The R&D revenue for the financial year 2015-16 was Rs. 252 crores. There were 128 patent applications filed during the year. The Institute has steadily built up a reputation for research and education both in India and abroad. The Institute has signed 32 MoUs with various universities and received governmental and ministerial delegations, from countries across the globe, for exploring areas of collaboration and cooperation.

The Institute has been able to attract outstanding faculty members from not just India but other parts of the globe. The Institute has 602 faculty members on rolls with many of them globally acknowledged for their research contributions. The Institute also has furthered links with international and national peer universities, enabling enhancement of research and educational programmes at the Institute.

In the 58 years of its existence, more than 50,000 students have graduated from IIT Bombay. The alumni of the Institute have made their alma mater proud through their achievements and contributions in diverse fields and our engagements with them are steadily growing.

I would like to place on record the outstanding work done by the faculty and the staff members of the Institute in strengthening teaching, research and outreach programmes.

Prof. Devang V. Khakhar
Director, IIT Bombay

Aspiration

- *To see IIT Bombay among the top ranks of technical universities, known for its outstanding undergraduate programme and for its contributions to research.*
- *Participate in solutions of problems facing the nation and the world by providing new ideas and talent.*

Academic Programmes

Launch of Bachelor of Design programme

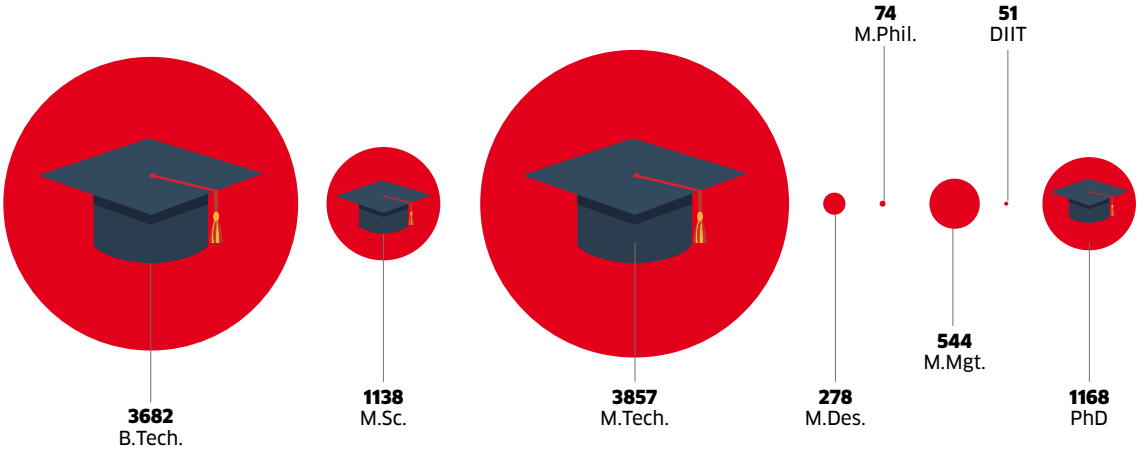
IIT Bombay has taken several initiatives in restructuring and strengthening its academic programmes at undergraduate (UG) and postgraduate (PG) levels over the past year: M.Tech. in Civil Engineering with specialisation in Construction Technology and Management; M.Des. Programme for all five disciplines; revision of course curriculum for the M.Sc. in Applied Statistics and Informatics (ASI) and M.Sc.- PhD (Dual Degree) in the Department of Energy Science and Engineering. Other new initiatives include initiation of the process for admission through Monash University in the Joint PhD programme of IITB-Monash Research Academy; Simplification of process of PhD thesis evaluation; Removal of the minimum duration of 8 semesters for B.Tech. students to complete their credit requirements. This can now be done in 4-years; and Revision of admission scheme to Dual Degree (M.Sc. + PhD) programmes.

Mr. Ashwin R, B.Tech., Aerospace Engineering receiving the President of India Medal

At the 53rd Convocation, 2389 degrees were awarded : B.Tech. - 559, Dual Degree (B.Tech. & M.Tech.) - 271, M.Sc. (5 Yr. Int.) -24 , M.Sc. (2 Yr.) – 194, Dual Degree (M.Sc.-Ph.D.) - 8, M.Tech. - 620, M.Des. - 61, M.Phil. - 18, M.Mgt. - 79, PGDIIT (Exit) – 6 and PhD – 230, M.Tech.+Ph.D. - 12.

The characteristics of the student population at the Institute are undergoing a significant change in the recent times. The on-roll strength in 2009-2010 was 6359 students

Degrees Awarded in the last Five Years (2012-2016)



*Dual degrees have been included twice wherever applicable.

of which 2838 (45%) were UG and 3521(55%) were PG. During 2014-15, the on-roll strength has increased to 9870 of which 4004 are UG students and 5866 are PG students. With the existing programmes, the UG population is saturated at 4146 (42 %) in the academic year 2015-2016, while the PG population will saturate at 5855 (59%), with a total of 10,001 students in the Institute. The Institute has responded to the large increase in its intake by substantially reorienting itself academically, technologically and administratively and using it as an opportunity to retain its leadership in engineering education.

The PhD student strength has been steadily increasing. We had 771 PhD students on roll in the academic year 2001-02, in the academic year 2011-12 the number rose to 1879, an increase of over 150% in a span of just 10 years. PhD student strength has increased to 2894 in 2015-16. On the Ph.D. output front, as compared to 123 PhD degrees awarded in 2005, the number of degrees awarded were 173, 180, 181, 266 and 325 (highest ever, in the history of IIT Bombay) in the years, 2011-12, 2012-13, 2013-14, 2014-15 and 2015-16, respectively. An interesting aspect of our PhD output, observed in the recent years, is the fact that around 65% of the degrees are in the engineering disciplines. All students involved in research at the Institute are given an opportunity to interact with research community at the national and international level by providing funds to attend international conferences. Besides research scholars, many students have also benefited from this scheme. The annual funding utilised by students has decreased from Rs. 4,05,89,800/- last year to Rs. 3,36,17,283/- this year. During the academic year 2015-16, 372 students were granted financial assistance for attending international conferences as against 553 for the previous year.

This year, 12 M.Tech. students, one M.Des. student and one M.Sc.-M.Tech. student were selected for the DAAD Scholarships 2015-16 under the Sandwich System.

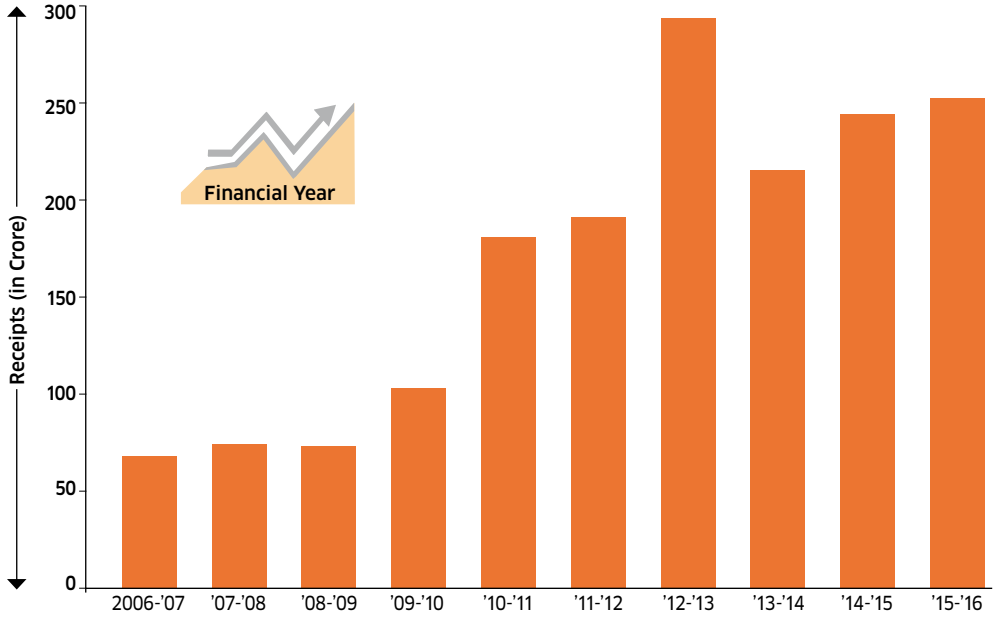
UG Teaching Assistantship: In an effort to make the senior UG students more self-sufficient and responsible towards academics, UG Teaching Assistantship was introduced during the academic year 2009-2010. This year, 167 UG Teaching Assistants (103 in Spring Semester and 64 in Autumn Semester) were appointed to assist the faculty in conducting the various UG courses.

Research and Development

The synergy of academics and research has catapulted IIT Bombay into the illustrious circle of world-class institutions. Apart from offering sound science and technology solutions to various government sectors, the industry and to society, IIT Bombay pursues basic research leading to knowledge generation that lays the foundation for empowering us as a nation to be technologically confident and self-reliant.

During the last ten years, R&D receipts grew at a compound annual growth rate (CAGR) of over 37 per cent. The R&D revenues for the financial year 2015-16 is Rs.252 crores. Figure 1 shows the growth of research funds in the last few years.

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



1. Overview

During the year 2015-16, new R&D projects were initiated in all the areas of science, engineering, management 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).

Table 1: Information on new projects sanctioned during last 3 years

	Sponsored Projects		Consultancy Projects	
Year	Number	Sanctioned outlay (Rs. in crores)	Number	Project outlay (Rs. in Crores)
2013-14	225	285.2	523	35.2
2014-15	294	165.25	513	32.2
2015-16	261	255.5	529	39.3

Sponsored projects sanctioned outlay ranges during the financial year 2015-16 from few lakhs (in Rs.) to 83 crores and the distribution of outlay ranges is shown in the Figure 2.

Figure 2: Distribution of sponsored projects-sanctioned outlay ranges

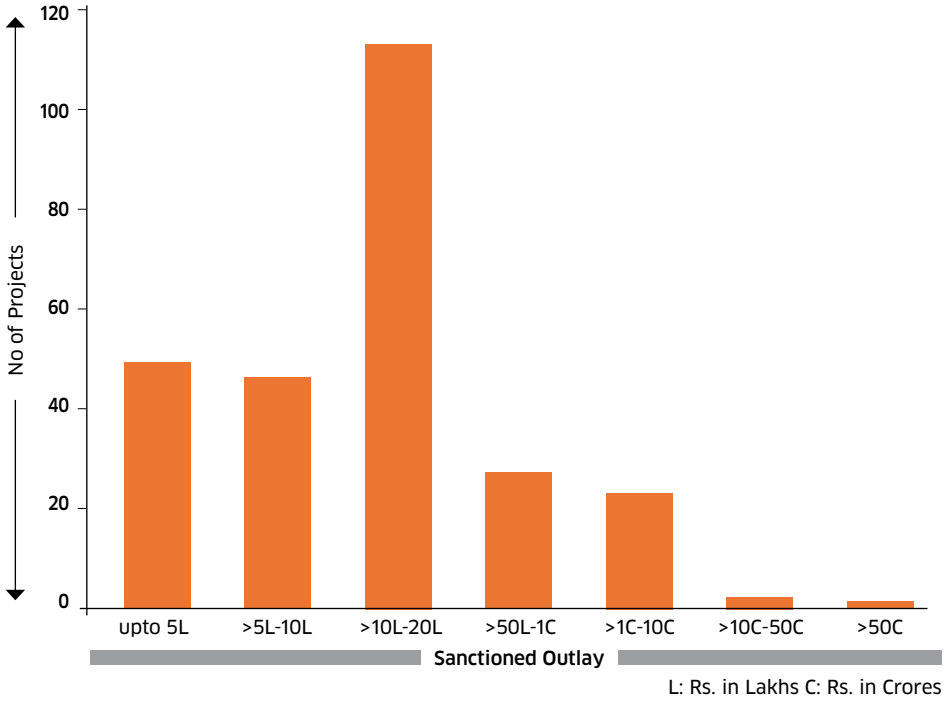


Table 2: Money received for R&D in 2015-16

Project Type	Number	Funds received (Rs. In crores)
Sponsored Projects	563	216.70
Consultancy Projects	591	35.14
Royalty	-	1.19
Equipment usage	-	2.04
Total	**1154**	**255.07**

The R&D work continues to be mainly supported by the government entities (Figure 3 and Table 3). Table 4 indicates some of the major sponsors from industry and other organisations.

Figure 3: Distribution of receipts from different agencies

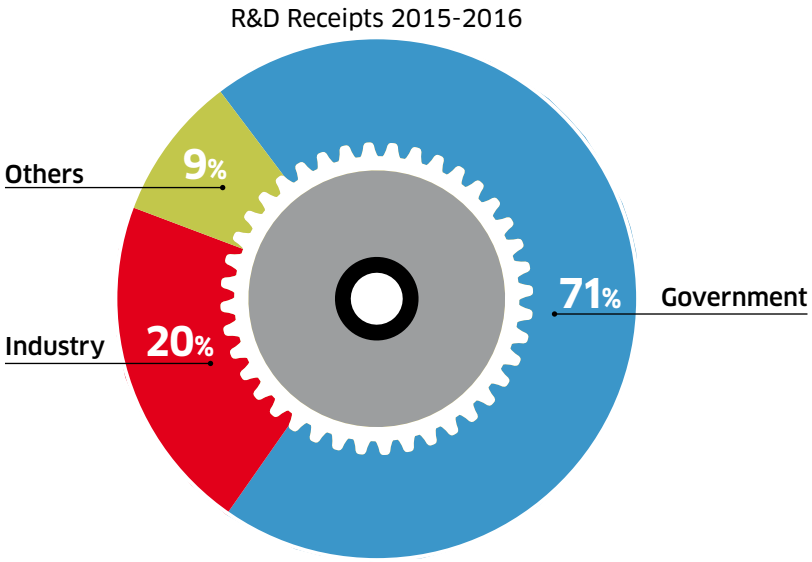


Table 3: Main sponsors of sponsored projects

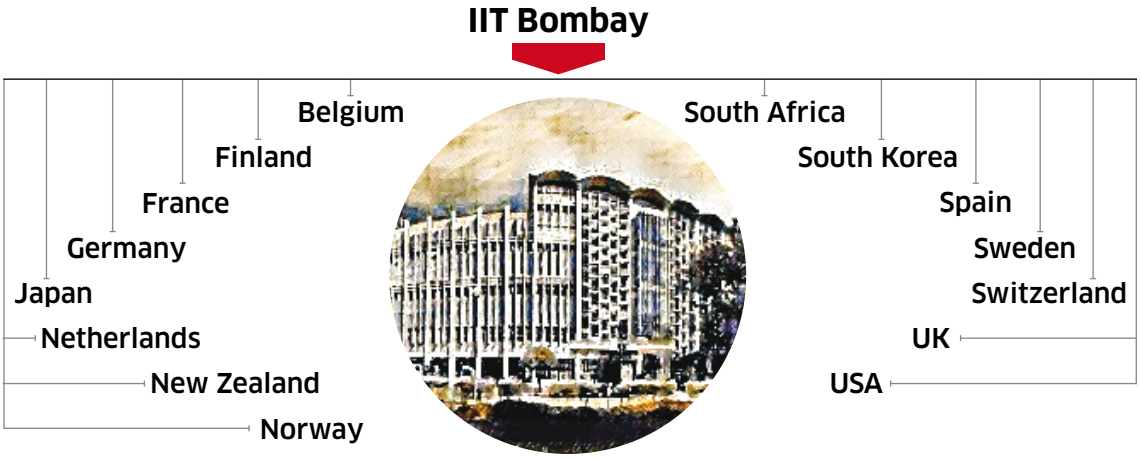
Agencies	Grant received (Rs. In crores)	Number of new/ ongoing projects funded
Department of Information Technology	53.09	17
Department of Science & Technology	48.61	175
Ministry of Human Resources Development	18.80	9
Department of Biotechnology	10.02	50
Ministry of New and Renewable Energy	7.37	3
Ministry of Steel	7.14	1
IDEA Cellular Ltd., Mumbai	5.32	1
Rajiv Gandhi Science & Technology Commission	4.61	4
Indo-US Science and Technology Forum	3.48	6
Applied Materials Inc., USA	3.23	6
Board of Research in Nuclear Science	3.07	23
Indian Space Research Organisation/ Department of Space	2.62	3
Power Grid Corporation of India Limited	2.28	1

Table 4: Sponsors from Industry and other organisations

- Bill and Melinda Gates Foundation, USA
- Bristol-Myers Squibb, USA
- European Commission
- Ford Foundation, USA
- Google, USA
- International Business Machines Corporation, USA
- Johns Hopkins Bloomberg School of Public Health, USA
- Loughborough University, UK
- Microsoft Mobile Oy, Finland
- NVIDIA Corporation, USA
- Qualcomm, USA
- Research Council of Norway
- Stockholm University, Sweden
- Swiss Agency for Development and cooperation, Switzerland
- Synopsys Inc., USA
- The Boeing Company, USA
- University of Pompeu Fabra, Spain
- Wellcome Trust, UK
- Accenture Technology Labs, India
- Bharati Foundation
- Cummins Technology India Limited
- GE India Technology Centre Pvt. Ltd.
- Hindustan Aeronautics Limited
- IDEA Cellular Limited
- Intel Technology India Pvt. Ltd.
- Microsoft Research Lab India Pvt. Ltd.
- Navajbai Ratan and Jamsetji Tata Trust
- NTPC Energy Technology Research Alliance
- Oil & Natural Gas Commission
- Portescape India Private Limited
- Power Grid Corporation of India Limited
- Reliance Industries Ltd., Mumbai
- Shakti Sustainable Energy Foundation
- Sir Dorabji Tata Trust
- Syngenta Biosciences Pvt. Ltd.
- Tata Consultancy Services Limited
- Tata Steel Limited
- Tata Teleservices Limited
- Wadhwani Foundation

Institute continues to get international funding for research and our international interactions (with countries) are shown in Figure 4.

Figure 4: IITB Interaction with Foreign Countries FY 2015-16



Some major sponsored projects initiated:

- National Centre of Excellence in Technologies for Internal Security
  Sanctioned outlay: Rs. 83.89 crores over five years
  Funding agency: Department of Electronics & Information Technology

- Localisation of Solar Energy through Local Assembly, Sale & Usage of One Million Solar Study Lamps by IIT Bombay - Phase II
  Sanctioned outlay: Rs.13.23 crores over two years
  Funding agency: IDEA Cellular Ltd. and Ministry of New and Renewable Energy

- National Carbonaceous Aerosol Programme : Carbonaceous Aerosol Emissions, Source Apportionment and Climate Effects
  Sanctioned outlay: Rs.10.68 crores over five years
  Funding agency: Ministry of Environment, Forest and Climate Change

- Development of Linear Fresnel Reflector System and Phase Change Material based Thermal Energy Storage with Steam Accumulator
  Sanctioned outlay: Rs. 9.34 crores over two years
  Funding agency: NTPC Energy Technology Research Alliance

- Molten Salt Loop with Central Receiver, Salt Storage and Heat Exchanger
  Sanctioned outlay: Rs. 9.24 crores over two years
  Funding agency: NTPC Energy Technology Research Alliance

- Visvesvaraya PhD Scheme for Electronics and IT
  Sanctioned outlay: Rs. 8.46 crores over five years
  Funding agency: Media Lab Asia

- Creating Digital Environment for Design in India - E-Kalpa (Phase II)
  Sanctioned outlay: Rs. 8.4 crores over three years
  Funding agency: Ministry of Human Resource Development

- Creating Biomedical Engineering and Technology (Incubation) Centre
  Sanctioned outlay: Rs. 7.85 crores over three years
  Funding agency: DST Ravjiv Gandhi Science & Technology Commission

- Heliostat Reflector Development with Tracking and Flux Measurement
  Sanctioned outlay: Rs. 7.71 crores over two years
  Funding agency: NTPC Energy Technology Research Alliance

- Special Manpower Development Programme for Chips to System Design
  Sanctioned outlay: Rs. 7.26 crores over five years
  Funding agency: Department of Electronics & Information Technology

Efforts were made to disseminate information and provide support to faculty regarding project funding from sponsors (both national and international).

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

Some consultancy projects initiated

- Automation study for Maharashtra Sales Tax Department
- Benchmarking of orthopedic implants and instruments
- Casting design optimization for steam turbine components
- Climate-Resilient Coastal protection and Management study
- Comparing economic growth of India with China and Korea - Role of IPR
- Condition assessment of synthesis loop waste heat boiler tube
- Cooling water outfall channel
- Design of EMC/EMI compliance power converters
- Development of a special coating for the eyewear
- Development of Electrical systems study for refinery
- Development of formulation for oral mucositis
- Energy efficient dryers
- Evaluation of road marking materials
- Full cell development for electric scooter Li-battery
- Heat pump for canteen applications
- Hydrological study of Ram river
- Indian emissions and emission inventories for GBD MAPS
- Life-Cycle Assessment of used tyres aimed at articulation of regulations and guidelinesLoad calculations for various steel structural profiles.
- Mixed flow gas test parameters for 3C4 environment class
- Multi utility heat pump and chilled water radiant panels
- Mumbai power system study
- Mumbai water distribution improvement programme
- OpenFOAM in Steel simulation research
- Proteomic investigations on effect of homeopathy preparations on healthy volunteers
- Quality issues on high carbon steels
- Research service qualitative requirement for miniature frequency and polarization agile antenna
- Review of Indian seismic code and base shear
- Structure elucidation of impurities of drug
- Studies on mineral blended cement stabilization for road works

- Study of load carrying capacity in korba region
- Technical advice on solid waste processing technology
- Technical study of MW & SW services of All India Radio for its reach and effectiveness
- Traffic impact assessment study
- Tri-Band conformal antenna for telemetry and transponder systems
- Verification of surge analysis and protection system for the water supply scheme
- Wind tunnel study for air curtains around the Taj Mahal

Internal Grants for R&D

The Institute provided internal funding for supporting faculty research and student activities. Grants of around Rs. 22.6 crores were sanctioned for these activities, which included the following:

- Seed grant for initiation of research for new faculty and Healthcare Consortium
- Augmenting research resources of faculty recipients of research/ review paper/ Young Investigator awards
- Research internships and fellowships for PhD student
- Student research/competition -- projects such as Automotive Racing, Design Competition, MARS Rover and Underwater Vehicle
- Upgradation and maintenance of central and national research facilities
- Leverage grants and bridge grants
- Grants for development of prototypes

R&D Award Grants from External Agencies

The Institute's research was recognised by peers and society in the form of award grants conferred on faculty, students and groups. Faculty Research Awards included Innovation in Science Pursuit for Inspired Research (INSPIRE) grant by the Department of Science and Technology in Civil Engineering, Electrical Engineering, Mathematics, Metallurgical Engineering & Materials Science and J. C. Bose Fellowship in Chemistry, Computer Science & Engineering, Electrical engineering and SERB National Post-Doctoral Fellowship in Chemistry, Google MOOCs Award in information technology, IBM PhD Fellow Award in Computer Science & Engineering. In addition, Centre for Science & Technology of Non-Aligned and other Developing countries have sponsored Fellowship award for developing country scientists in Electrical Engineering and Civil Engineering.

2. Licensing Activities

Technology Transfers

We continue to receive royalties for different IPs licensed in the past. Some of the technologies licensed in this year are:

- Contacting device & multi utility heat pump
- Fuel additives for improving efficiency
- Polymer mediated synthesis of ZnO nanostructures
- Software for bid matching in power exchange
- Software for computation of sharing of interstate transmission charges & losses
- Super heat recovery water heaters based on tube heat exchanges

3. Dissemination/Outreach

Global R&D Summit 2015

IIT Bombay participation in the R&D Exhibition of 'Global R&D Summit'

IIT Bombay participated in the R&D Exhibition of 'Global R&D Summit 2014' organised by Federation of Indian Chambers of Commerce and Industry (FICCI), New Delhi and the Department of Science & Technology, Government of India at Vigyan Bhawan, New Delhi during December 7-8, 2015. The summit aimed to explore avenues of partnerships for Indian technology based start-ups and build capacities for market assessment and rapid commercialization of research. It also aimed to create unique networking ground for local and global research community and to create avenues for industry-academia-government partnerships by showcasing R&D projects, programs and success stories to the R&D community. The event was inaugurated by Mr. Nitin Gadkari, the Hon'ble Union Minister of Road Transport & Highways and Shipping and Mr. Y.S. Chowdary, Hon'ble Minister of State for Ministry of Science & Technology & Earth Sciences, Government of India. Apart from IIT Bombay, 26 other government R&D institutions and industry such as Defence Research and Development Organisation, Department of Biotechnology, Indian Oil Corporation Ltd., CSIR Labs. participated in the event. A large number of dignitaries, R&D personnel from the government institutions and industry and general public visited the exhibition.

Make in India Week

IIT Bombay participated in the 'Make in India Week' programme organised by the Government of India during February 13-18, 2016 at MMRDA Grounds, Bandra Kurla Complex, Mumbai.

Prior to this event, IIT Bombay conducted Hackathon activity in the campus. Housed and trained students from across India participated in the competition. Final winners of Hackathon made presentation on February 16, 2016 at the 'Make in India' event. Institute also coordinated participation of all the seven old IITs in the event.

4. Augmentation of Research Infrastructure

As part of creating and upgrading infrastructure for enabling R&D activities, the Institute has been establishing state-of-the-art equipment, based on the recommendations of the Research Infrastructure Funding Committee (RIFC). Under this initiative, eight new equipments were procured as Central facility (facility made available to all at the Institute). These equipments were installed and made available for use to IIT Bombay academic community during the year. A list of installed facilities is given below:

Central Facility

- Conductive Atomic Force Microscope
- Four Dimentional X-ray Microscopy
- High resolution XRD system
- Laser Scanning Confocal Microscope
- Protein Crystallography
- Spinning Disc Confocal Microscope
- Two dimensional Gas Ghromatograph with rapid scanning time of flight Mass Spectrometer
- X-Ray Diffractometer

Also, several equipment and facilities were procured from external grants. Some of these are given below:

- 3D Particle Image Velocimetry Laser
- Active infrared imaging system for solar module characterization
- Broadband 120 sec three component digital seismographs
- Double Sided Mask Aligner
- Four-target E-beam evaporator
- Interfacial Shear Rheometer with Liquid trough
- Laser system for pulsed laser deposition of thin film
- Low pressure chemical vapor deposition furnaces
- Magneto optic cryostat
- Multi Target Sputter System
- Piezo-electric cutting force dynamometer for signal conditioning
- Rapid prototyping system for medical applications
- Soil cyclic tri-axial and asphalt testing system
- Thermo-mechanical Simulator
- Wafer dicer precision dicing system

5. Intellectual Property (IP) Protection Activities

During the year, 128 Indian patent applications were filed. The growth of patent filings in the last few years is given in Figure 5. Table 5 gives a list of all Indian and international IPR filings.

Figure 5: Growth of patent applications from 2011-12 to 2015-16

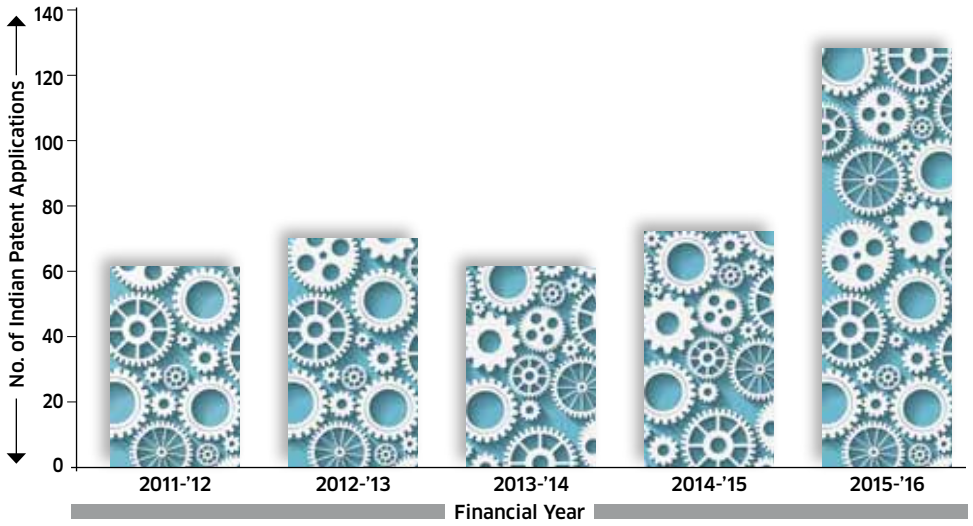
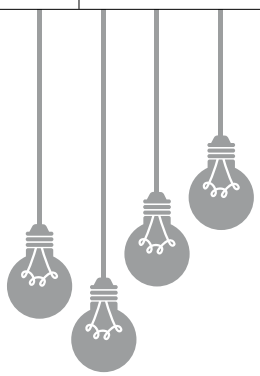


Figure 5: Patents Applications filed during 2015-16

Territory	No. of Applications
PATENTS	
Indian	**128**
PCT	**6**
US	**5**
Eu & Brazil	**4**
TRADEMARKS AND DESIGN	
Indian	**8**



Twenty four Indian patents and seven US patents, one Canadian and one Europe patents were granted during the year. In addition, five Indian Trademarks were registered during this period. Proactive efforts continued for licensing of these technologies, products and designs.

Areas of IP filings included: Aerospace rotor system, air pollution control devices, biomedical devices & biosensors, chemical processes, communication systems & ICs, drug delivery systems, electronic & energy storage devices, high voltage ceramic resistors, light weighting of vehicle bodies, memory devices, MEMS sensors, microfluidics, multilevel converters, optics, photovoltaics, precision motion, robotics, synthesis of nano fibres, vortex flow metering, water pollutant filters, wireless communication systems and others.

As in the previous year, proactive efforts were made to assess the possibility of intellectual property in the work of M.Tech./Dual degree students to file for possible protection. For this, almost 480 abstracts were reviewed, out of which about 23 were shortlisted for a possible filing of patent applications. Eleven patent applications filings have been initiated so far.

Nearly 50 agreements were finalized and signed during the year including those for research collaboration, licensing, non disclosure agreements, IP transfer, student sponsorships, endowment, material transfers, etc. with industries, organisations, universities and government, both national and international.

6. Awards for Intellectual Property Activities

i) Thomson Reuters India Innovation Award 2015

The Institute was awarded one of the 'Top 50 Indian Innovators' for the year 2015 by Thomson Reuters in recognition of its innovation and patenting activity. The criteria used to select the winners include the patent portfolio size, success rate, extent of globalisation and influence of innovation, based on the research and analysis using the Derwent World Patents Index, Derwents patents Citation Index Data and Thomson Innovation tools.

ii) Innovation Award for development of a technique for membrane protein purification

Prof. I. N. N. Namboothiri, Department of Chemistry and researchers at the Ariel University and Weizmann Institute, Israel have developed a novel technique for membrane protein purification. This technology development was presented recently at the Techconnect event in Washington DC, USA. It was identified as one of the top 15% technologies submitted and selected for the Techconnect Innovation Award, 2016. The method is useful in Proteomics (i.e. simplification of 2D gels). The primary application areas include biotech and pharma sectors.

7. Focused Initiatives

Several initiatives have been taken to promote and facilitate R&D activities, especially among students. Some of them are:

Enhancing industry partnership

There have been continued interactions with industries, both national and international, to explore collaboration opportunities in research.

Brochure entitled "Industry Interactions" highlighting the possible modes of interactions between IIT Bombay and industry was prepared to disseminate information on R&D activities to visitors and at various industrial forums. Also, the "R&D Highlights" and "Technologies available for licensing" brochures were updated.

Some of the Industries and PSUs which visited IITB to explore research collaborations:

Exxon Mobil, Siemens, Future Group, Shell, BASF, Hindustan Aeronautics Ltd., Gas Authority of India Ltd., KEC International, Bajaj Auto, TAL Manufacturing Solutions, CEAT Tyres, Amazon Catalyst, Lear Corporation, ICL Innovation, Delux Bearings, Hilti, Deutsche Bank, Accenture, Proctor & Gamble, Total Oil India, Reliance, Huawei Telecom, Altair, Pulraj Electronics, Endee Engineers, Semiconductor Research Corporation,Cisco, Hyundai, Jubilant and Life Insurance Corporation of India.

ONGC-PAN-IIT interaction:

A meeting with Program Advisory Committee (PAC) of the ONGC – PAN IIT Collaborative Research Program was held on September 19, 2015 in Delhi. Four out of the seven research proposals submitted by IIT Bombay were approved to be funded by ONGC under this scheme. Following are the select papers:

- Application of Passive seismic technology (3D Tomography) for sub-surface mapping (PI: Prof. G. Mohan)
- An organometallic fingerprinting proxy to locate shale oil pools (PI: Prof. S. Dutta)
- Evaluation of spatial distribution of methane gas hydrates in sediments and their influence on geotechnical properties and geomechanical modelling for sea floor stability (PI:Prof. D. N. Singh)
- Underground Coal Gasification (Techno-economic Feasibility and Design) for Indian Coals (PI:Prof. Sanjay Mahajani)

TCS-IIT Bombay Research Cell:

TCS and IIT B have jointly established a Technology Research Cell under a multi-year, multi-research agreement with a focus on 'Intelligent infrastructure' as a theme. Several research areas such as program analysis, next generation information extraction, testing and electric power management and design are covered under the cell.

Eight joint research projects are currently being executed, and patents and publications have resulted out of this partnership. In the

past year, the IITB-TCS cell approved two new projects:

- Multi-channel processing for Distant Speech Recognition
- Multi-disciplinary participatory research on inclusive interaction and service design patterns.

Healthcare Research Consortium:

1) Following new members were inducted into the Healthcare Research Consortium during the year:

- Municipal Corporation of Greater Mumbai Hospitals (MCGM), which includes KEM Hospital, Sion Hospital, Nair Dental Hospital and Nair Hospital.
- National Institute of Immunohematology (NIIH).
- Mahatma Gandhi Mission Institute of Health Sciences (MGMIHS)
- Amity University
- A3 Remote Monitoring Technologies Pvt. Ltd.

2) Five new projects were awarded the Healthcare seed grant to pursue blue sky research in healthcare. For each proposal, collaborators from IIT Bombay join hands with one of the member institutes to come up with a project of mutual interest. In many cases, these projects move on to bigger proposals funded by national level funding agencies.

3) A seminar entitled "Big Data for the Common Good: Being a Dataologist" by Dr. Nitesh Chawla, Associate Professor of Computer Science and Engineering at the University of Notre Dame was organized in IIT Bombay.

Institute Ethics Committee

The Institute Ethics Committee (IEC) reviewed 25 proposals of which 14 were approved and the rest are under review. IEC introduced new review processes like "pre-meeting review" of proposals by 1-2 committee members and expedited review of proposals which fall under the category "less than minimal risk". These new processes have greatly reduced review time of the proposals. Training sessions have been conducted for committee members to keep them updated on various ethical issues in research and methodologies adopted by Indian Council of Medical Research and other international bodies.

Other activities

Dr. R. Chidambaram, Principal Scientific Advisor to the Government of India, visited IIT Bombay on December 28, 2015 to have discussions with faculty groups working on urban flooding, battery research and the Dandi Memorial project. He also interacted with faculty members who have companies incubated in the Society for Innovation and Entrepreneurship (SINE) regarding high-tech start-ups. Faculty members and the Centre of Excellence in Nanoelectronics (CEN) and National Centre for Photovoltaic Research and Education (NCPRE) also participated in the interaction.

A meeting cum interactive session with the German House for Research and Innovation (DWIH) delegation was held at IIT Bombay on January 23, 2016 to disseminate information about the opportunities available for research and academic collaborations between India and German institutions. It was also meant to intensify the existing Indo-German cooperation in order to keep pace with the global developments in the fields of science and innovation. The delegation included representatives from 15 German organisations.

Incentives for R&D

Rewards for research excellence, technology development efforts, research/review publications and industry impact were given in the year as earlier (Table 6). Recognition included cash awards and research grants and arranging Institute-wide dissemination through lectures and electronic media.

Table 6: Award recipients in 2015-16

Awards	Names of Recipients
S.C. Bhattacharya Award for Excellence in Pure Science	Prof. C.P. Rao, Department of Chemistry
H.H. Mathur Award for Excellence in Applied Science	Prof. I. Samajdar, Department of Metallurgical Engg. and Materials Science
Research Paper Award	Prof. Dulal Panda, Department of Bioscience and Bioengineering Prof. Debabrata Maiti, Department of Chemistry Prof. Prasenjit Ghosh, Department of Chemistry Prof. R.S. Jangit, Department of Civil Engineering Prof. Anil Kottantharyil, Department of Electrical Engg.
Review Paper Award	Prof. Sanjeeva Srivastava, Department of Biosciences and Bioengineering Prof. R. Murugavel, Department of Chemistry
Young Investigator Award	Prof. Maheswaran Shanmugam, Department of Chemistry Prof. Suryanarayana Doola, Department of Energy Science and Engg. Prof. Amartya Mukhopadhyay, Department of Metallurgical Engg. and Materials Science
Dr. P.K. Patwardhan Technology Development Award	Prof. Jayanta Kumar Nayak, Prof. Rangna Banerjee, Prof. Santanu Bandyopadhyay, Prof. Shireesh B. Kedare and team Department of Energy Science & Engg.
Research Internship awards	Given to bright students across the country to undertake research at IIT Bombay for six months, based on national advertisement and selection process: ■ No. of applications received : 292 ■ No. of Intern selected: 63 ■ No. of Intern joined and completed : 49

Dissemination/ Outreach

A workshop on 'Central Facilities' was held on October 8, 2015, where the 32 Conveners of central facilities made presentations on technical specifications and capabilities, the types of experiments carried out and the usage. About 110 faculty members and students attended the workshop.

Lectures by domain experts (Institute faculty) on the work of winners of the Nobel Prize 2015 were organised at the Institute on October 26, 2015.

Talk by Mr. Martin Zoltick and Mr. Soumya Panda (both US Patent attorney, Rothwell, Figg, Ernst & Manbeck, P.C) on 'Patent protection for software-related technology and open source software licensing' was organised on January 14, 2016.

1. Review of IRCC Seed Grant

Recipients (Faculty members) of IRCC Seed Grant during the year 2008-09 and 2009-10 made presentations to IIT Bombay academic community on September 28-29, 2015. Around 50 faculty members made presentations on the objectives of the projects undertaken, research output, R&D personnel trained, further projects applied and got sanctioned from external funding agencies, publications, patents applications filed & granted, awards & recognition received and so on. Issues pertaining to specific departments, Non-Plan grants among others were discussed.

2. Safety activities at the Institute

Keeping in mind the importance of safety, a video on 'Chemical Safety, Gas Cylinder Safety, Laser Safety and Radiation Safety' was prepared and disseminated to IIT Bombay academic community. New laboratory safety website was prepared and hosted on http://www.iitb.ac.in/safety/.

3. Online processes

Interface for identifying faculty members by research area wise, updation of RIFC status (procurement, installation, etc.), central facility-External Users: usage details in drona and information on IRCC website, updation of new drona website (Drupal), online formats of UC and SOE for new funding agencies, maintaining details of Acting PI details while faculty proceeding on long leave, accounts related activity in handling advances and honorarium requests by PI when fund is negative, implementation of new salary guidelines on project staff recruitment, process for FAQs, portal for submitting technical write ups, modified process flow of project staff delegation, process for modified accommodation norms, modification of sponsored project proposal submission process(service tax).

For ERP system: Preparation of document and process of all IRCC activities, training to implementing staff and related activity.

4. Project Manpower

The number of project staff involved in various projects as on March 31, 2016 is 1358. Of them, 615 joined during the financial year 2015-16.

Research Facilities

Wire EDM Machine

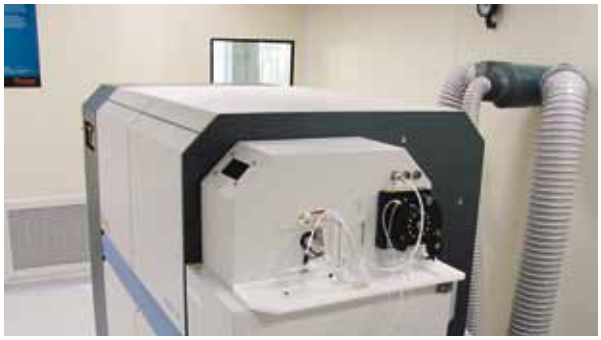

Cryo FEG Scanning
Electron Microscope


Spinning-Disk-Confocal Facility

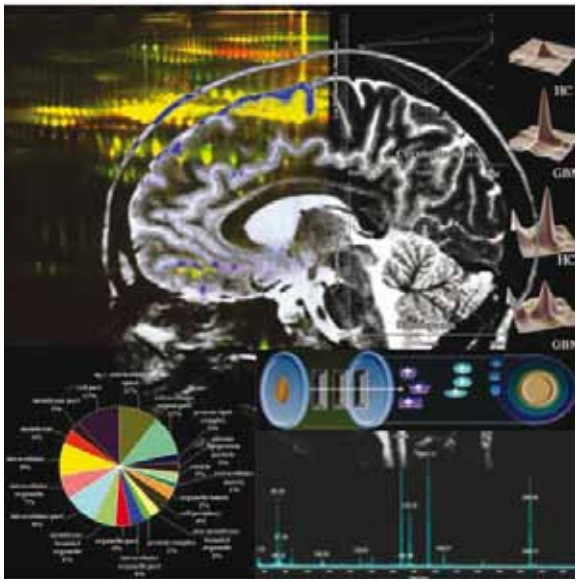
High Resolution X-Ray Diffractometer


Sudarshan, The National Geotechnical Centrifuge Facility

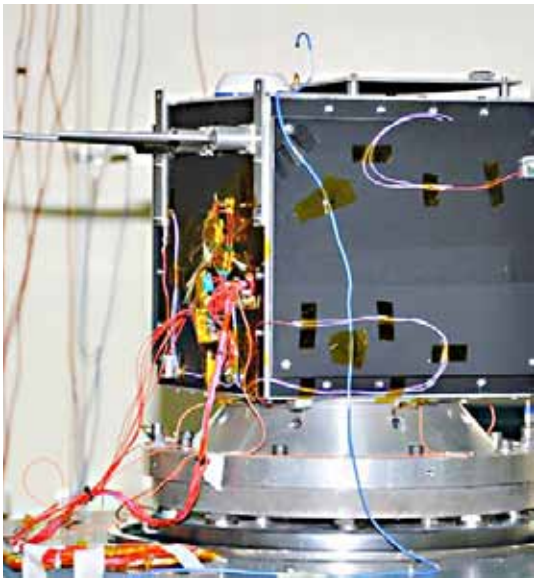

Confocal Laser Scanning Microscopy


ICP Mass Spectrometer

Glimpses Of Research (Projects)

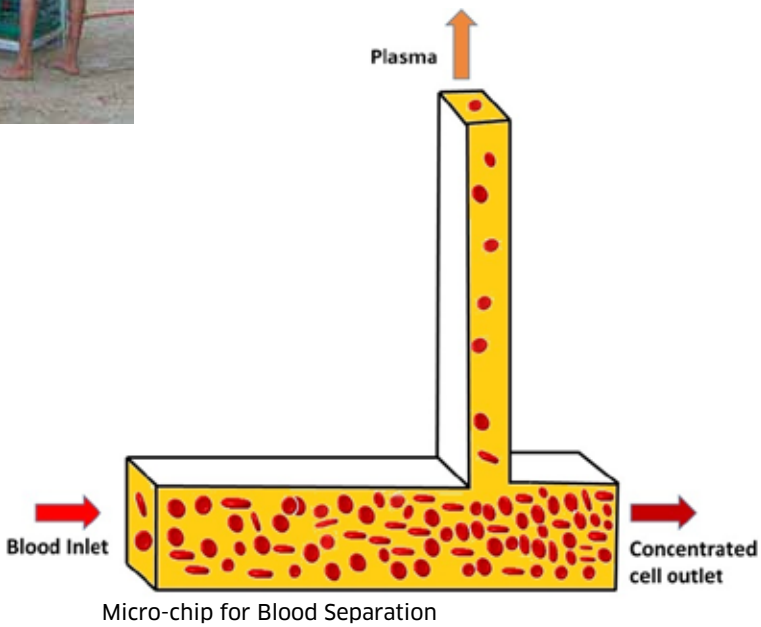


Blood Proteins to detect Brain Tumours



IITB Pratham - Student Satellite

Extraction process for Herbal Oil



Micro-chip for Blood Separation

Mahatma's Mandate: Sanitation

Outreach Programmes

The Continuing Education Programme & Quality Improvement Programme (CE &QIP) office at IIT Bombay has been offering training programmes to the professional fraternity from both industry as well as academic institutions. A large number of working professional, academia and students have participated and acquired knowledge from short and long term courses during 2015-16.

The QIP courses are fully funded by the All India Council for Technical Education (AICTE) and are open for faculty members of AICTE recognised engineering colleges.

In order to provide college teachers an opportunity to interact with industry professionals, special efforts have been made to permit a few industry participants as part of the QIP courses, in the normal CEP mode. The model has been much appreciated by the teachers as well as the industry personnel, and has also helped to improve the overall effectiveness of the various QIP courses.

Many of our CEP courses are now well established worldwide and continue to attract large participation, both from India and abroad. Some of the courses such as "Urban Drainage Management", "Human Computer Interaction", "Energy Management", "Executive Programme in Management", "Leadership Development Centre", "Dynamics and Control in State-Space (DCSS)", "Expo CD and Expo PDI", "Strategies for Organisations Growth" and "Finite Element Method and Application in Civil Engineering" have all been appreciated by the industry.

During 20215-16, a number of courses on social issues like energy recovery from solid waste, planning and design of scientific landfill sites, addressing special focus area in sewer waste management (biomedical/slaughter house/hazardous/E-waste), refresher-cum-orientation course on road works for local bodies were conducted by the faculty of Centre for Environmental Science & Engineering and Civil Engineering Department.

The CEP course on "Piping Engineering" (contact version) has reached another milestone and has crossed its 68th edition in 2015. About 10000 engineers have registered in the last 25 years. Online version of the course, started in July 2009, has continued during the year. It has attracted registration from about 500 participants from across the globe, which is expected to grow further.

In terms of the overall performance of CE & QIP during 2015-16, a total of 133 CEP courses were conducted with about 2569 participants from across different disciplines as well as from the industries, organisations and institutions, generating a revenue of around Rs.6.69 crores. Under QIP category, one M.Tech. and 7 PhD students from AICTE approved of engineering were admitted. In addition, 12 teachers were inducted into PhD programme under the Advance Admission Scheme.

Further, nine short-term courses (STC), sponsored by the AICTE, were conducted and attended by 228 participants from various engineering institutions/colleges.

Faculty Affairs

During the year, 25 faculty members on regular basis and 17 on contract basis were appointed. The number of full-time faculty members on the roll of the Institute has risen to 602 comprising 289 Professors, 139 Associate Professors, 143 Assistant Professors, and 31 Assistant Professors (Contractual Basis). In addition, there are 52 adjunct faculty members and 113 post doctoral fellows on the roll. Around 11 faculty members retired – four of whom were re-employed and two resigned during the year.

The Institute provided financial assistance to 250 faculty members for participating in international conferences. In addition, 69 faculty members travelled abroad for attending international conferences using external funding and 16 faculty members went abroad on Fellowship 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. A.S. Khanna, Department of Metallurgy and Materials Science, has been appointed as Chairman of the sectional committee of the Bureau of Indian Standards for Raw materials for paints, varnishes and other products.

Prof. Alok Porwal, Centre of Studies in Resource Engineering (CSRE), has been appointed as Associate Editor of the Elsevier journal "Ore Geology Reviews" and Member of the Editorial Advisory Board of the Springer Journal "Natural Resources Research".

Prof. Amit Agrawal, Department of Mechanical Engineering, has been awarded the "DAE-SRC Outstanding Investigator" Award. He has also been elected as Fellow of the Indian National Academy of Engineering (INAE) for the year 2015.

Prof. Anil Kumar, Department of Chemistry, has been chosen for the Chemical Research Society of India Bronze Medal-2016.

Prof. Ankur Kulkarni, System & Control Engineering, has been selected as an Associate of the Indian Academy of Sciences, Bangalore.

Prof. Atanu Ghosh, Shailesh J. Mehta School of Management, has been admitted as a Fellow of All India Management Association (AIMA). He was also invited to join the Board of Governors of Indian Education Society's Institute of Management College and Research Centre, Bandra and Institute of Apparel Management, Gurgaon.

Prof. Bijnan Bandyopadhyay, Department of Systems and Control Engineering, has been appointed as an Associate Editor of the IEEE Transaction on Industrial Electronics for a period of three years.

Prof. C.P. Rao, Department of Chemistry, has been elected for the fellowship of the Indian National Science Academy.

Prof. D. Ramakrishnan, Department of Earth Science, has been chosen as the National Coordinator for leading and implementing the national programme on "Networked Projects on Hyperspectral Remote Sensing and Applications".

Prof. Deepankar Choudhury, Department of Civil Engineering, has been invited to join the Editorial Board of one of the oldest and prestigious journals in Geotechnical Engineering, "Canadian Geotechnical Journal" published by NRC Canada.

Prof. G. Haripriya, Department of Humanities and Social Sciences, has been invited to join the Department of Economics, Harvard University, as a Visiting Scholar for a period of one year.

Prof. G.K. Lahiri, Department of Chemistry, has been selected for the prestigious Chemical Research Society of India Silver Medal for the year 2015.

Prof. G. Rajaraman, Department of Chemistry, has been selected to receive the prestigious AV Rama Rao Young Scientist Award for the year 2015 in recognition of his excellence research contributions.

Prof. G. K. Adil, Prof. A. Patwardhan, Prof. Vinish Kathuriad, Prof. I. Mukherjee, and Prof. T. T. Niranjan of Shailesh J. Mehta School of Management have been recognized among top 5% researchers in the management field in the country by an article published in a prestigious management journal.

Prof. I.K. Rana, Department of Mathematics, has been elected for the post of the President for 'The Association of Mathematics Teachers of India (AMTI)' for a period of two years from April 1, 2016.

Prof. J.K. Verma, Department of Mathematics, has been appointed as a Member on the Editorial Board of Indian Journal of Pure and Applied Mathematics (IJPAM) by INSA.

Dr. K. Mahesh, Project Research Scientist, Cell for Indian Science and Technology in Sanskrit, Department of Humanities and Social Sciences has been chosen for the prestigious "Young Historian of Science Award"' by Indian National Science Academy, New Delhi in recognition of his research contributions to the field of History of Science.

Prof. K. Narayanan,
Department of Humanities and Social Sciences, authored two books titled "Innovation and Global Competitiveness: Case of India's Manufacturing Sector" and "Globilization of Indian Industries : Productivity, Exports and Investments" respectively.

Prof. K. Ramasubramanian, Department of Humanities & Social Sciences, has been appointed as a Member of the Rashtriya Sanskrit Parishad (Central Sanskrit Board) constituted by the Ministry of Human Resource Development, Government of India.

Prof. K.V. Venkatesh, Department of Chemical Engineering, has been elected as Fellow of the Indian Academy of Sciences, Bangalore.

Prof. Kannan Moudgalya, Department of Chemical Engineering, has been selected for the HINDUSTAN TIMES for Mumbai award and also bagged the first prize for the Spoken Tutorial project in the Reimagine Education Competition, under "Nurturing Employability" category.

Prof. Krishna P. Kaliappan, Department of Chemistry, has been selected as a fellow under "Dr. S.K. Pradhan Endowment established at the Institute of chemical Technology, Mumbai in Pharmaceuticals Science & Technology" for the year 2015-16. He has also been elected as a Fellow of the Indian Academy of Sciences, Bangalore.

Prof. Krithi Ramamritham, Department of Computer Science and Engineering, has been selected to receive the Outstanding Service Award, in recognition of his services as the Editior-in-Chief of IEEE Embedded Systems Letters from July 2011 to December 2015.

Prof. Maheswaran Shanmugham, Department of Chemistry, has been awarded the prestigious INSA Medal for Young Scientist – 2015.

Prof. Parinda Vasa, Department of Physics, has been elected as a Member of the Indian National Young Academy of Science (INYAS), for the period 2016-2021.

Prof. Pulla Rao, Department of Chemistry and Prof. Ramgopal Rao, Department of Electrical Engineering have been appointed as JC Bose Fellows.

Prof. Pushpak Bhattacharya, Department of Computer Science and Engineering (currently the Director of Indian Institute of Technology Patna), has been appointed as President of the Association of Computational Linguistics (ACL). He has also been elected as Fellow of the Indian National Academy of Engineering (INAE) for the year 2015.

Prof. R. Balaji, Department of Civil Engineering, received The Institution Prize (Donated by Col G N Bajpai) from Institution of Engineers India (IEI) for his Journal paper titled 'A Load Cell for the Measurement of Slack Mooring Forces', published in the Series 'C' Journal of IEI, Vol. 95, Issue 3, during the 30th Indian Engineering Congress, held at Guwahati , Assam on Dec 18, 2015.

Prof. R.B. Sunoj, Department of Chemistry, has been appointed as Fellow of the Royal Society of Chemistry under "Leaders in the Field" scheme for his outstanding contributions to computational methods in chemical reactions.

Prof. Ram Gopal Rao, Department of Electrical Engineering, has been selected to receive the prestigious Prof. CNR Rao Bangalore INDIA NANO Science Award for the year 2015.

Prof Ramesh Singh, Department of Mechanical Engineering, has been selected to receive the Swarnjayanti Fellowship for a period of five years.

Prof. Rohit Srivastava, Department of Biosciences & Bioengineering, has been selected for the "Biotech Product & Process Development and Commercialization Award" for the year 2014-2015.

Prof. S.A. Soman, Department of Electrical Engineering, has been elected as Fellow of the Indian National Academy of Engineering (INAE) for the year 2015.

Prof. Santanu Bandyopadhyay, Department of Energy Science and Engineering, has been elected as Fellow of the Indian National Academy of Engineering (INAE) for the year 2015.

Prof. Satish Agnihotri,
Centre For Technology Alternative in Rural Areas (CTARA), has been appointed as a Member on the Central Advisory Committee of the Central Electricity Regulatory Commission.

Prof. Shivaram Kalyanakrishnan,
Department of Computer Science and Engineering, has been chosen as one of 'AI's 10 to Watch' Young Scientists.

Prof. Sourav Pal, Department of Chemistry, has an unique achievement to his name. Two of his papers has found its place in the list of most popular (most read) articles of Journal of Chemical Physics 2015. One of them is under Atoms, Molecules and clusters and the other in the section of Theoretical Methods and Algorithms.
President of Chemical Research Society of India (CRSI), presided over the CRSI Annual meeting held at Panjab University, Chandigarh between February 5-7, 2016. He also chaired the Chemical Division Council meeting of Bureau of Indian Standards on March 9, 2016 at New Delhi.
Prof. Sourav Pal, Department of Chemistry and President of Chemical Research Society of India, has also been nominated to be a member of the Executive Council of the Federation of Asian Chemical Societies.

Prof. Souvik Mahapatra, Department of Electrical Engineering, has been elected as a Fellow of IEEE.

Prof. U. K. Anandavardhanan, Department of Mathematics, has been chosen by the INSA Council to be one of the founding members of the National Young Academy of Science (INYAS).
He has also been awarded the NASI Scopus Young Scientist Award 2015, for his outstanding research contributions.

Prof. Vinish Kathuria, SJMSOM, has been awarded the "Distinguished Alumni Award" for professional achievements in the field of education by National Institute of Technology Kurukshetra.

Student Affairs

The students at IIT Bombay explore their interests in a plethora of activities. There are excellent recreational facilities for sports, including gymnasiums, swimming pools, courts for tennis, basket ball, volleyball, hockey, football and cricket, athletics tracks, and many more. Along with studies, sports activities too are carried throughout the year. All the events are organized by a capable Institute Sports Council headed by General Secretary, with the able guidance of Sports Officers, Chairman Sports and Dean Students Affairs.

Cultural Activities

Regular cultural events such as SPICMACAY International Convention, NSO Culturals, Institute Prom Night were organised for the benefit of interested students.

Summer School of Cult (SSoC): Summer vacations provide an ideal opportunity for students who stay back on campus to cultivate their interests in areas beyond just academics. Classes offered in multiple genres including music, dance, film and fine arts generated good response.

The Performing Arts Festival (PAF): This year, PAF saw a close competition, ultimately leading to a tie at the top position. The overall PAF season was overwhelming experience for both the performers as well as participants.

TECHFEST

IIT Bombay's annual international science and technology festival called TechFest, celebrated its 18th anniversary this year. The event witnessed a footfall of more than 165000 people comprising mainly of the youth from across the nation and an out-reach of over 2500 colleges across India and over 500 overseas universities. Some of the activities organised as a part of Techfest 2016 are as follows:

Lecture series: A platform for both the brilliant and the blooming to connect and have an interaction of a lifetime.

Exhibitions: The segment is one of those rare avenues where you can see and experience a wide spectrum of modern technology with a very unique collection of exhibits from across the world.

Technoholix: A perfect blend of science technology with the tinge of entertainment. Every year it presents you the world's most renowned artistes & their awesome work.

Ozone: Lighter side of Techfest that keeps the festive spirit at Techfest alive and kicking. A potpourri of awesome setups, enchanting international artistes, whacky competitions and funky workshops with a

CEO of Uber Mr. Travis Kalanick at IIT Bombay

tinge of technology.

Competitions: With the fields for competitions this year ranging from sustainability and design to advanced robotics to events based on pure sciences, Techfest has something in store for everyone. Some of the main attractions in it are.

Robowars: It is a game of style, control, damage and aggression with the robots pitting each other in deadly combat.

International Challenge: Techfest has launched a totally new segment containing vivid international events which will put your brains to work and give you an international platform for proving your skills and make your name. It comprises of International Robotics Challenge, Solar Urja Lamp, KTH Master's Challenge.

Mood Indigo

Ideate: In it, Techfest invites the participants to bring their ideas to the fore and change the way humans interact with people and Earth to create a real impact. Ideas are primary drivers for the empowerment of the society. Ideate has successfully sparked the entrepreneur in young minds to solve societal and industrial problems.

Techfest International Summit on Internet of Things: This year Techfest introduced a completely new segment which is the International Summit on the topic of 'Internet of Things'. 'Internet of Things' allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between the physical world and computer-based systems. The summit was graced by Dr Bob Frankston (co-creator of spreadsheets) and a panel discussion was held where the panel consisted of delegates of companies like Qualcomm, Cisco, Ericsson, etc. A workshop on 'Internet of Things' was conducted by Texas Instruments.

Social Initiatives: Techfest has been a pioneer in undertaking unique social initiatives for a cause to generate the awareness and create a platform where people can come together to voice their concerns collectively. Some of the initiatives this year were 'Internet For All' (aimed at spreading digital literacy), and Recycle (for fitness and environment consciousness)

Internet For All (IFA): A connectivity vehicle, equipped with exhibitions of latest science and technology to inspire school children traveled from Mumbai to Delhi through 48 villages spreading the much needed digital literacy and access to the source of infinite knowledge and information, the Internet. The motto was to provide a sweet taste of Internet to the remote rural areas and prepare them to adopt 'Digitalisation and Internet' along with the rest of the nation.

MOOD INDIGO

The annual cultural festival Mood Indigo held during December 18-21, 2015, saw an overwhelming response from the youth of the country who came to IIT Bombay to witness the four day extravaganza. The festival witnessed more than 220 events and saw a footfall of 1,31,000.

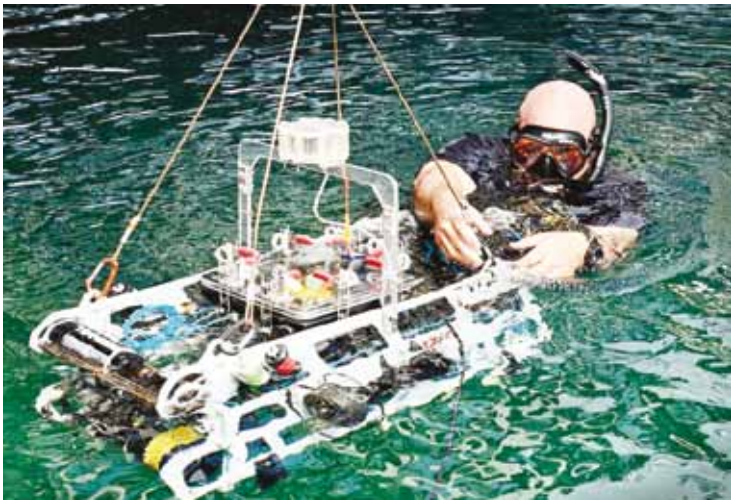
Pronites: Mood Indigo'15 has witnessed

a tremendous increase in the scale of pronites as for the first time it was shifted to Gymkhana grounds which has been occupying more than 15,000 attendees in each concert. Borgeous, who is counted among the world's best DJs performed at the EDM night that filled the youth with utmost enthusiasm during the festival. Other pronites includes Nostalgia night by Shaan, Contemporary Night by Parikrama and Lucky Ali; Popular Night by Pritam, Neha Kakkar, Javed Ali and many more Bollywood singers.

Competitions: Competitions at the festival saw a whole new level of innovation this year. While the flagship competition in dance, music and dramatics stayed the point of attraction, what captivated people's minds were the newly-launched competitions in various genres like music, digital arts and dance. To add a cultural flavour to the festival, various competitions in the folk arts genre were also introduced. Under the "Live Your Passion" campaign, the participants received various incentives which included performances at prestigious stages like the NCPA, Nescafe Labs, BalconyTV etc. The competitions saw participation from over a thousand colleges panning various cities like Delhi, Pune and Bangalore.

Media: The festival was extensively covered by various mainstream and regional media houses. Various news channels also featured the festival on television. In an attempt to explore the new mode of mass communication, social media,

Techfest - 2015



Matsya - IIT Bombay's Autonomous Underwater Vehicle (AUV)

the organisers indulged in posting live updates via various social networking sites like Facebook, Twitter and Instagram. In addition, a 12 page newsletter was published in association with Bombay Times which was distributed in over 40, 000 households in Mumbai. The Media Team also explored other avenues of publicity like outdoor hoardings and publicity in cinema houses. It also accomplished on-ground publicity by visiting various colleges across the city.

Popular and Cultural Events:

Over 200 national and international artists participated, continuing the legacy of bringing the maximum number of international artists to a college festival. The Litfest featured eminent personalities like Shashi Tharoor, Anurag Kashyap, Rajkumar Hirani, Markandey Katju and many more. Other events featured artists like Vir Das and Sharman Joshi with the introduction of Dance Showcase inviting MJ5, Terrence Lewis Dance Academy etc. In addition, there were a lot of other international artist groups from Britain, Israel and Australia who enthralled the audiences with their amazing performance.

Placement

The formal campus placements involving company interviews for the academic year 2015 was conducted in two phases. Preparations for these phases stated in July 2015. The first phase of IIT Bombay's campus placement in December 2015 saw participation from around 260 companies and 1000 job offers. Till June 2015, a total of 308 organizations have taken part in campus placements and have offered 1143 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 (PhD) programs in various fields of engineering, science and technology, design and humanities participated in the placement process. There were a total of 1628 students registered for campus placements in 2015-16. This is up from just 1250 in 2010-11 and has required Placement Office (PO) to appropriately scale up its approach towards campus placements.

Student registration for campus placements opened in August 2015 with the customary introduction to the placement process by the Professor-in-charge and student placement team. Companies were invited July 2015 onwards to fill up online "Job Announcement Forms" which opened to students registered for placements from early October. Pre-placement talks by some companies, provided an avenue for interaction and familiarisation of students with recruiting organisations and their work profile as a run up to formal placements. Companies are increasingly being asked to make only electronic presentations rather than on-campus talks, especially if they have visited IIT Bombay over the past few seasons. The company interview process for the first phase began on December 1, 2015. A small number of eligible students did not actively participate in the placement process due to their other career choices.

December 1, 2015, the first day of formal placements, saw 33 firms, representing some of the most coveted jobs in global industry vie for our students. An unprecedented 174 jobs were offered on that day reconfirming the commitment of top recruiters to IIT Bombay graduates. Placement season 2015 also saw the presence of many more "core" engineering companies on the first day of campus placements. This year 2015-16 also had the formal placement process for IDC conducted separately starting from May 14, 2016 to better synchronize with the academic calendar for final year students at IDC.

Engineering and Technology

Our students continue to demonstrate strong commitment to their core educational background in their choice of employment. Majority of students opted for science, engineering and technology-oriented jobs with the recruiting companies operating in various sectors of the economy.

Data Analytics

The reputation of superior analytical and reasoning skill of IIT Bombay graduates continued to draw recruiters from the rapidly growing field of data analytics. There were 91 job offers from 38 organisations making it one of the biggest recruiters after engineering and information technology. This trend from last few years seems to have taken strong roots at IITB.

Consulting Sphere

Over 27 leading consulting firms, including several global leaders, visited IIT Bombay for campus recruitment this year. These organisations work with large corporations across the world and help them resolve complex business problems. Management Consulting companies especially carry a reputation of being very selective in their choice of campuses and follow extremely high standards in their recruitment process. Over 105 offers were made in the consulting sector.

Financial Services

The financial service sector was a major recruiter this year too. Many of the top global companies in financial sector visited the campus and made over 113 offers open to students. The rapid ongoing digitization of financial services sector in India has also resulted in strong presence of Indian financial firms in a sector traditionally dominated by multinationals at IITB.

Research & Development

With the economy increasingly striving for high-end products and services, a larger number of companies now develop products on the forefront of technology. IIT B saw an increase in the number of organisations hiring fresh graduates in the research and development sector. A total of 27 R&D organisations offered 88 positions this year.

Education

IIT Bombay continues to provide faculty to several educational institutions through campus placement over the past several years. Over 51 students, including some with doctoral degree, have been offered jobs in public and private educational institutions through campus placement.

Start-ups

IIT Bombay continued to attract 'start-up' companies including many started by its alumni. Start-ups have started to challenge more established companies in their quest for hiring talent at IITB. The informal work culture, opportunity to make immediate and visible contributions, chance to own equity etc. seem to attract IITB students to start-ups. Start-up companies, different from the more usual e-commerce sector, have also started making their presence felt in campus placements. A "job fair" involving start-up companies was also held in the second phase in January 2015 in collaboration with E-cell.

Diverse Recruiters

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

Preparing well-rounded students

As in previous years, a key focus of the Placement Office was to prepare the students for placement and internships. 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. Talks with the alumni working in diverse sectors were also organized to orient the students to different job requirements. Around 1330 preparatory sessions were organised by the Placement Office. Senior and experienced alumni from the corporate sector were available at the Placement Office during December 2015 to counsel and advise students in need.

Conclusion

The successful student placement in 2015-2016 clearly demonstrates the demand of IIT Bombay graduates among the top recruiters in various segments of the economy. A majority of our past recruiters held their faith in the abilities of our students and came to recruit in large numbers. This year several new organisations visited the Institute, and we look forward to fostering long-term relationship with all these organisations.

Program-wise placement data 2015-2016:

Academic Programme	Registered	Placed*	Percent placed
B.Tech.	502	397	79.8
Dual Degree (B.Tech.+M.Tech.)	237	185	78.5
M.Tech.	573	429	74.86
5-yr M.Sc.**	16	11	68.75
2-yr M.Sc.**	110	44	40
PhD**	-	18	-
M.Des.***	-	35	-
M.Phil*	-	2	-
Dual Degree (M.Sc.+M.Tech.)*	-	4	-

(* All registered students do not necessarily participate actively in campus placements. Some eligible students may have alternate plans like higher education etc. but still register for campus placements. Note that the students also get placed through channels other than campus placements.
**For M.Sc. and PhD students, higher studies and post-doctoral work can be a priority.
***Large number of M.Des. students are placed post "design-degree show" in mid-June.)

Placement detail by type of organisation:

Sr. No.	Sector	No. of Organisations	No. of Offers Received
1	Analytics	38	91
2	Consulting	27	105
3	Education	12	51
4	Engineering and Technology	90	371
5	Finance	23	113
6	FMCG	9	24
7	Public Sector/Government	2	18
8	Research & Development	27	88
9	Services	5	12
10	IT/Software	75	270
	Total	**308**	**1143**

Placement detail by range of salary offered:

Range of Gross Salary (in Lakh Rupees per annum)	Number of Organisations	Number of Offers Received
Above 11	96	435
Between 9.5 to 11	48	177
Between 8 to 9.5	52	181
Between 6.5 to 8	50	155
Between 5 to 6.5	50	239
Less than 5	12	56
Total	**308**	**1143**

Internship Report

The Internship Session 2015- 2016 saw 1047 offers from around 650 organisations. There were Pre-Placement Offers (PPO) made to students for final placement based on their internships in 2014-15, of which, 94 were accepted by students.

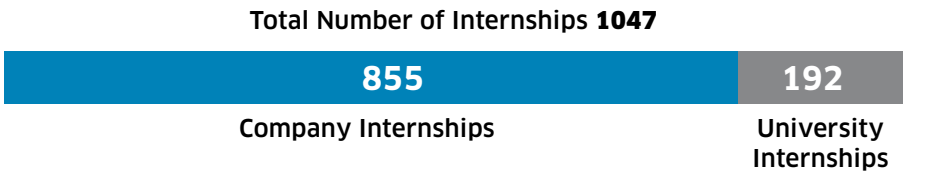
The internship season started in July 2015 and continued till May 30, 2016. The students in the 3rd and 2nd years of Bachelor of Technology (B.Tech.), 5 -year and 2-year Master of Science (M.Sc.) and Dual Deg ree (D.D.) programmes in various departments participated in the internship process.

Department-wise Internship Data 2015-16 (2014-15) (2013-14):

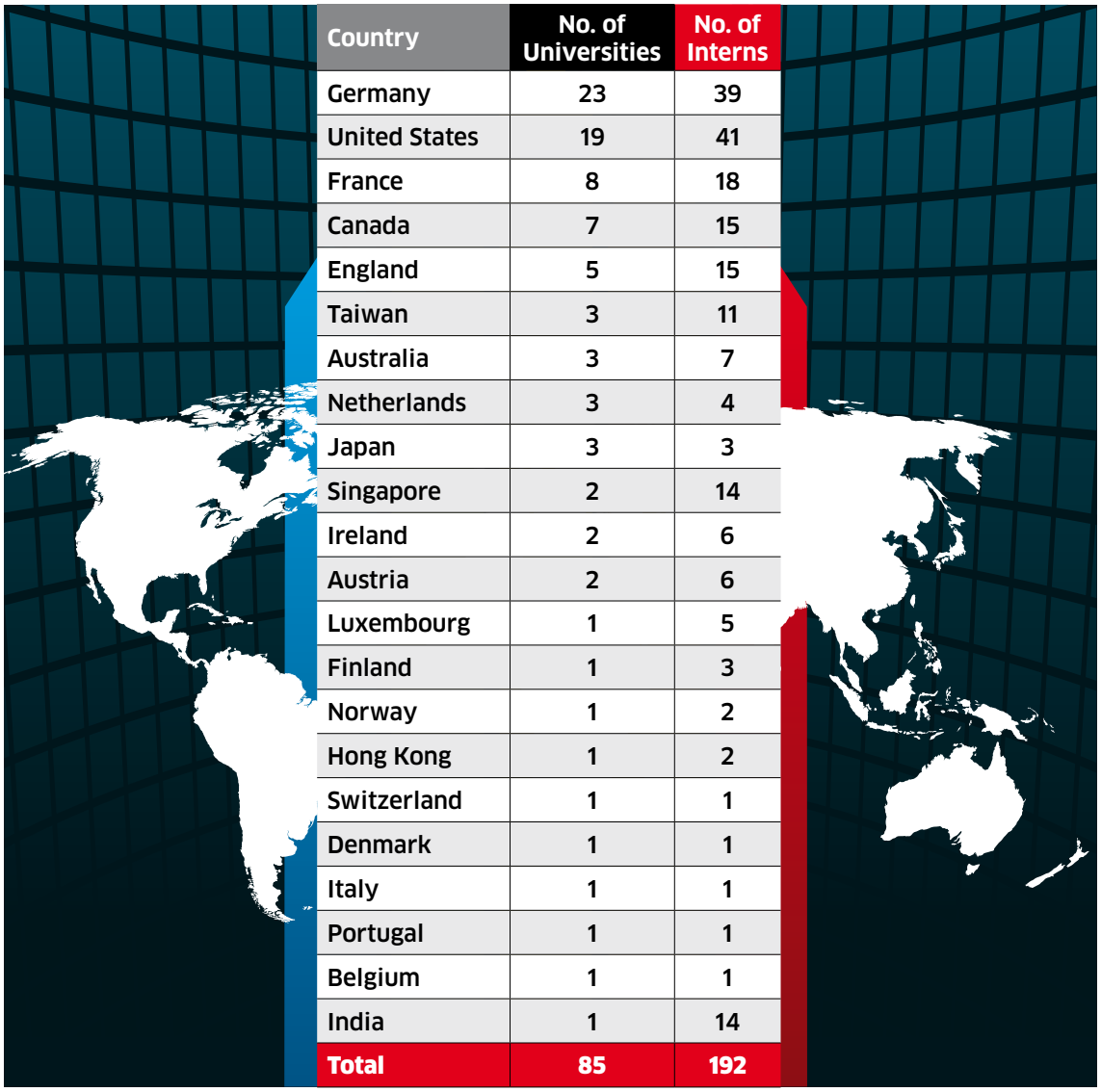
Department	Number of Internships
Aerospace	**48 (65) (66)**
Chemical	**117 (129) (143)**
Chemistry	**22 (21) (24)**
Civil	**95 (99) (90)**
Computer Science	**201 (157) (154)**
Engineering Physics	**33 (41) (22)**
Electrical	**167 (189) (138)**
Energy Science	**37 (35) (30)**
Mechanical	**162 (152) (168)**
Metallurgy	**112 (101) (77)**

Summer vs. Winter Internships:

Companies vs. Universities

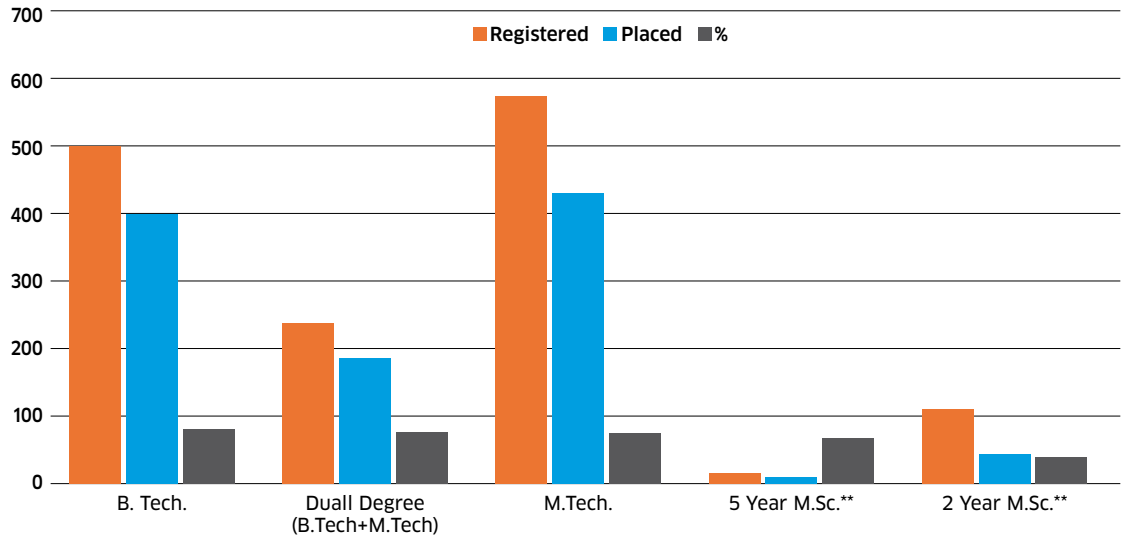


Country-wise offers from Universities:

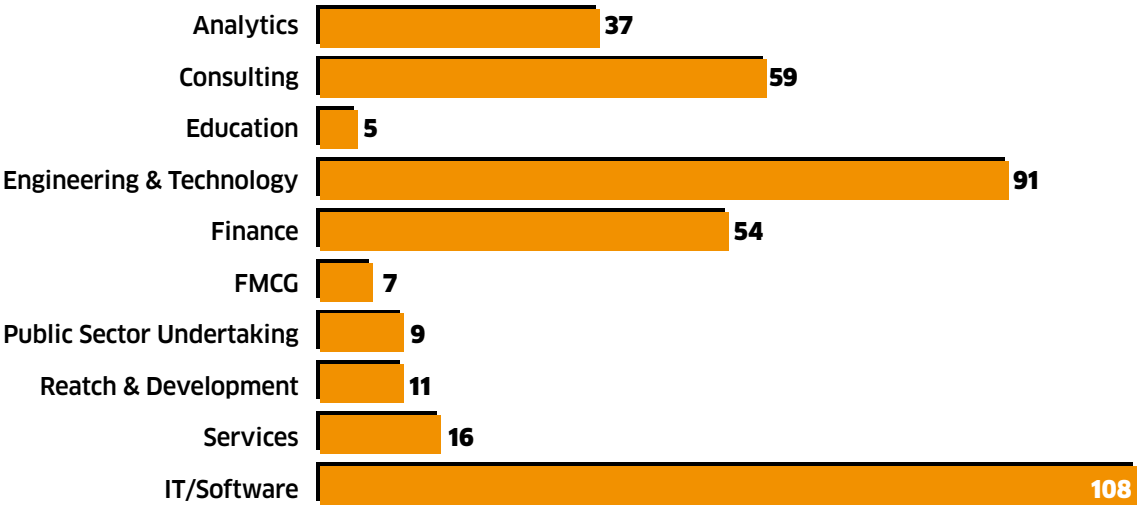


Country	No. of Universities	No. of Interns
Germany	23	39
United States	19	41
France	8	18
Canada	7	15
England	5	15
Taiwan	3	11
Australia	3	7
Netherlands	3	4
Japan	3	3
Singapore	2	14
Ireland	2	6
Austria	2	6
Luxembourg	1	5
Finland	1	3
Norway	1	2
Hong Kong	1	2
Switzerland	1	1
Denmark	1	1
Italy	1	1
Portugal	1	1
Belgium	1	1
India	1	14
Total	**85**	**192**

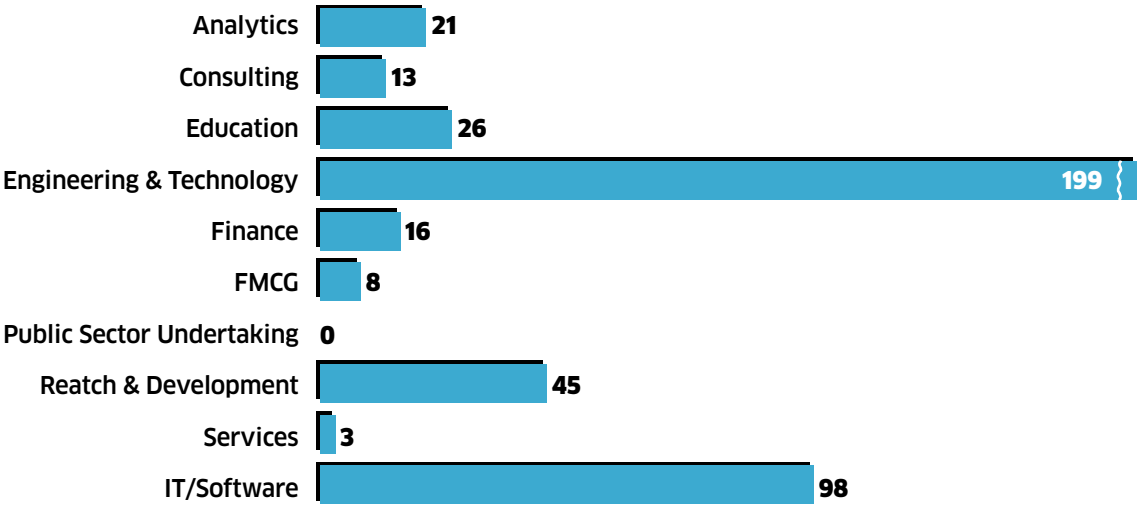
Students Registered vs Placed Campus Placement 2015-16



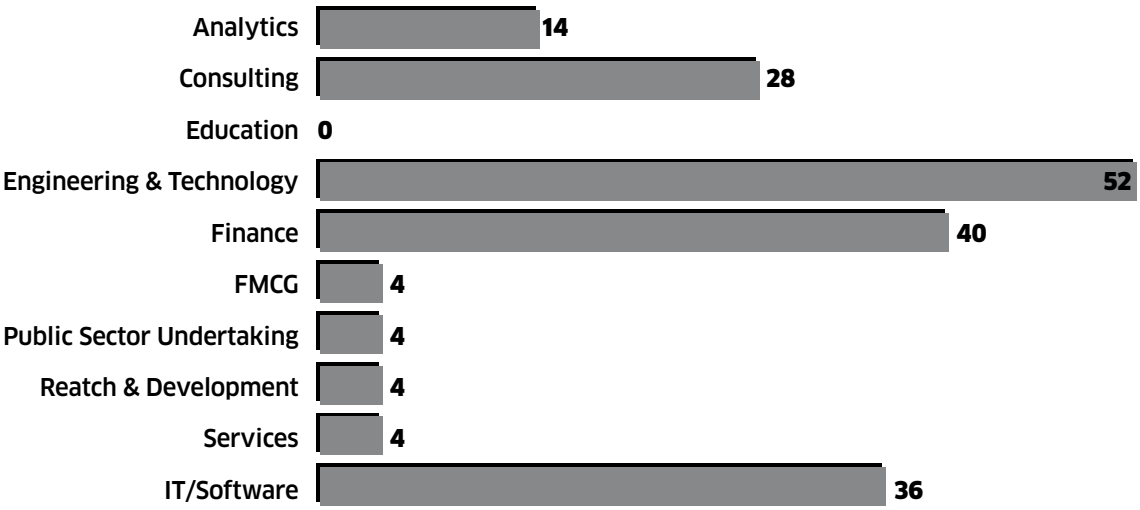
Sector wise selections: B.Tech.



Sector wise selections: M.Tech



Sector wise selections: Dual Degree



Society For Innovation And Entrepreneurship

The Society for Innovation and Entrepreneurship (SINE) is an umbrella for promotion of entrepreneurship at IIT Bombay. It administers a business incubator, which provides support for technology-based entrepreneurship and facilitates the conversion of research activity into entrepreneurial ventures.

SINE has so far incubated 82 companies. This year SINE hosted 28 companies, of which, 14 are new companies and seven have graduated. Of the current companies, nine have received investments from Venture Capital/Angel investments and 13 are based on technology/knowhow from the Institute. The existing companies are from various technologies such as education, cleantech, mechatronics, nanotechnology, engineering software, fintech, environment, medtech and healthcare.

SINE has been self sustaining since inception. It has received grants from GoI organisations like DST, TDB, DeiTy and also some CSR funding from a few corporates to seed support its start-ups.

SINE also actively associates with the entrepreneurial ecosystem of the IITB like eCell, Desai Sethi Centre for Entrepreneurship, Healthcare Consortium, Tata Centre, BETiC IITBAA etc.

Going forward, SINE is initiating new programmes to enhance its incubation activities like setting up a bio-incubator, accelerator, grand challenge events with international collaboration, short-term incubation programmes in association with some corporates like Intel, SAP etc.

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International Relations

IIT Bombay assigns 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 bright and young researchers from all over the world, as faculty of the Institute.

A good number of international students have also come to the Institute either as full-time or as exchange students.

During the year, IIT Bombay has signed 32 MoUs with various foreign universities and received governmental and ministerial delegations, from countries across the globe, for exploring areas of collaboration and cooperation.

MoUs with Foreign Universities:

- National Cheng Kung University, Taiwan
- National Research Tomsk State University, Russia
- Curtin University of Technology, Australia
- University of New South Wales, Australia
- Friedrich-Alexander Universitat Erlangen-Nurnberg, Germany
- Peter the Great St. Petersburg Polytechnic University, Russia
- The University of Pavia, Italy
- Polytechnique Montreal, Canada
- Ecole Centrale de Lille, France
- University of Quebec at Trois-Rivieres, Canada
- Technical University of Denmark, Denmark (Erasmus+ Programme)
- Leibniz University of Hanover, Germany
- National University of Singapore, Singapore (Joint Degree Program)
- Polytechnic University of Madrid, Spain (Erasmus+ Programme)
- "Gheorghe Asachi" Technical University of Iasi, Romania (Erasmus+ Programme)
- Institute for Problems in Mechanics of the Russian Academy of Sciences, Russia
- University of Geneva, Switzerland
- Virginia Polytechnic Institute and State University, USA
- Free University of Berlin, Germany
- Skolkovo Institute of Science and Technology (Skoltech), Russia
- University of Luxembourg, Grand Duchy of Luxembourg
- Saitama University, Japan
- University of Cuenca, Ecuador
- Kyoto University, Japan
- Bogazici University, Turkey
- University of Calgary, Canada
- McMaster University, Canada
- Colorado School of Mines, USA
- Nanyang Technological University, Singapore
- National Chiao Tung University, Taiwan
- Hochschule fur Gestaltung Schwabisch Gmund, Germany

MoUs with other institutions

- National Institute of Technology Goa
- Govt. College of Engineering Amravati
- Tata Institute of Fundamental Research, Mumbai

MoU signing with Tata Institute of Fundamental Research

Visits of International Delegations

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

MoU signing with National Institute of Technology Goa

- Prof. Ms. Ainhitze Bizkarralegorra Bravo, Country Representative from Euraxess Links India to conduct an information session on 'Research Opportunities in Europe'.

- Prof. Lalit Goel, Director, Global Education and Mobility and Prof. Johnie Goh, Assistant Director, Student and Academic Services Department from Nanyang Technological University, Singapore

- Jody Lehr-Waite, Associate Director of International Outreach, Rochester Institute of Technology, USA, Ms. Sheela Thyagaraj and Ms. Suman Nayak from The International Knowledge Center, Bangalore.

- Dr. Steven A. Ringel, Director, Institute for Materials Research, Dr. Dave Williams, Dean of College of engineering from The Ohio State University, US and Mr Ardeshir Contractor, Managing Director and CEO of Kiran Energy Solar Power Pvt. Ltd.

- Dr. Takehito Higuchi, Fellow, Doctor of Management of Technology and Mr. Yuji Nishikawa, India Liaison Representative, from Japan Science and Technology Agency, Japan

- Prof. Friso De Boer, Head of School of Engineering & Information Technology & Mr. Girish Iyer, Manager International Marketing & Recruitment from Charles Darwin University, Australia and Mr. Chintan Bharwada from Australian Trade Commission, Mumbai.

- Elena Donets, CEO, Tel Aviv University Enterpreneurship Center and Claudelle Monis, Cultural Officer from Consulate General of Israel, Mumbai.

- Dr. Sheila Embleton (Distinguished Research Professor) and Prof. Roopa Desai Trilokekar (Assistant Professor) from York University, Canada.

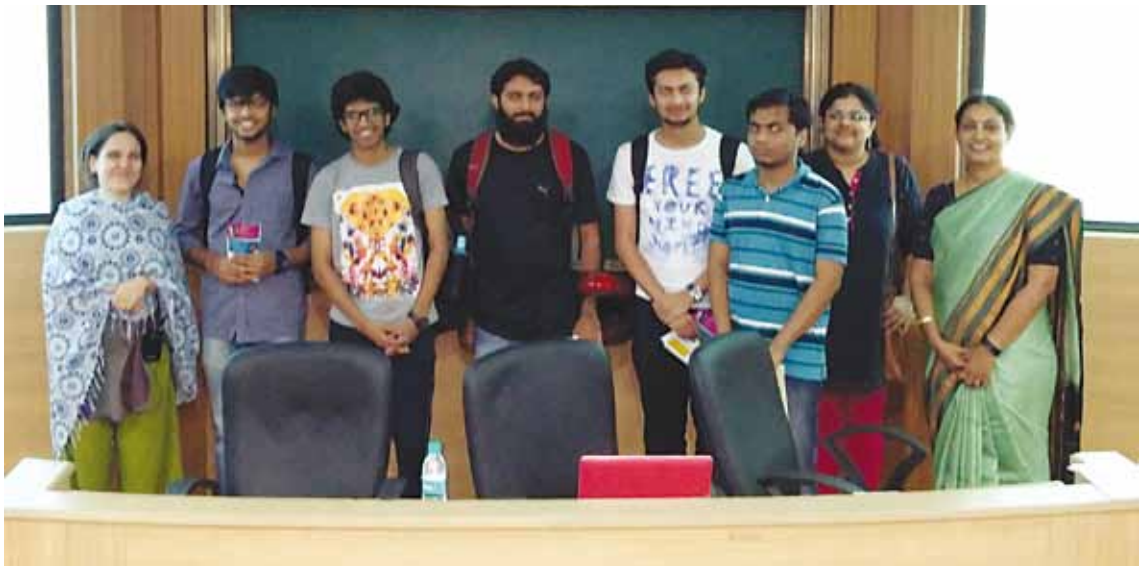
- Prof. Hiroshi Iwai (Vice Dean, Distinguished Chair Professor),Prof. Sin-Horng Chen (Senior Vice President), Prof. Chun-Yen Chang (President Emeritus) and Prof. Edward Y. Chang (Senior Vice President) from National Chiao Tung University, Taiwan.

- Mr. Michael Oskin (Vice Consul), Ms. Koyel Sen (Consular Information Unit) from U.S. Consulate and Mr. Pranav Pradhan (Education USA Adviser) from USIEF.

- Ms. Cristina Chiriboga Tejada, Consultant & Ms. Varsha Perera, Assistant, from the Consulate General of Ecuador in Mumbai.

- Delegates from University of Tartu, Tallinn University of Technology and Archimedes Foundation Centre for Higher Education Development, Estonia.

IITB-IU-SPEA Workshop Team



Ms. Ainhitze Bizkarralegorra Bravo, Country Representative from Euraxess Links India

- Mr. Tomohiro Toi, Mr. Atsushi Matsutani and Mr. Shubham Yadav from Tanaka Holdings Co., Ltd., Japan.

- Dr. Mark Sheridan (Dean/Vice Provost for Graduate Affairs) and Dr. Sukant Misra (Associate Vice Provost for International Programs) from Texas Tech University, US.

- Prof. Brett Kirk (Associate Deputy Vice Chancellor), Prof. Vishnu Pareek (Head of School of Chemical Engineering), Prof. Piyush Sharma (Professor of Curtin Business School) and Prof. Abhijit Mukherjee from Curtin University, Australia.

- Prof. Edward Crawley (President) and Prof. Mikhail Myagkov (VP for Academic Outreach and International Relations) from Skolkovo Institute of Science and Technology, Russia.

- Mr. Sam Schreiner (Ambassador), Ms. Laure Huberty (Deputy Head of Mission) from Embassy of Luxembourg, New Delhi, Ms. Jayshree Lakhotia and Mr. Kamal Lakhotia from Counsellor for Cultural & Tourism Promotion Consulate Office of Luxembourg, Mumbai.

- Prof. Dr. Marie-Louise Klotz (President), Mr. Gautam Saha (Director of South & South Asia region), Dr. Peter Juergen Scholz, Dr. Maike Reichardt from Rhine-Waal University of Applied Sciences, Germany.

- Prof. Urban Westergren (Deputy Director of Intl. Affairs), Prof. Rajeev Thottappillil (Head of Electromagnetic Engg.), Ms. Alphonsa Lourdudoss (Regional Advisor-India), Ms. My Delby & Ms. Manja Schubert (International Coordinator) from KTH Sweden.

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

International Students

A total of 65 International students from Australia, Bangladesh, Canada, Denmark, Ethiopia, Finland, France, Germany, Iran, Japan, Nepal, Nigeria, Singapore, Sweden, Switzerland, Tanzania, Turkey, UK and USA have joined the Institute for course work / project work /post graduate studies.

Student Exchange Programs

	Name of the University	No. of students/ Programmes
1.	Aalto University, Finland	Two Dual Degree students from Electrical Engineering Dept., and Mechanical Engineering Dept. respectively.
2.	Bogazici University, Turkey	Four Dual Degree students from Electrical Engineering Dept.
3.	Ecole CentraleSupelec, France	Two Dual Degree students from Electrical Engineering and Energy Science and Engineering Dept. respectively.
4.	ETH Zurich, Switzerland	Two B.Tech., and one Dual Degree students from Physics Dept. and one M.Mgt., student from SJM School of Management.
5.	KTH Royal Institute of Technology, Sweden	One Dual Degree student from Electrical Engineering Dept. and two Dual Degree students from Mechanical Engineering Dept.
6.	Nanyang Technological University, Singapore	Three Dual degree students from Electrical Engineering Dept.
7.	National University of Singapore, Singapore	Two Dual degree students from Electrical Engineering Dept., one Dual degree student from Mechanical Engineering Dept., two B.Tech. students from Chemical Engineering Dept. and Computer Science & Engineering Dept., respectively.
8.	Peter the Great St. Petersburg Polytechnic University, Russia	One Dual Degree student from Energy Science and Engineering Dept.
9.	Ryerson University, Toronto, Canada (OMG Program)	One Dual Degree student from Electrical Engineering Dept.
10.	Tallinn University of Technology, Estonia (Erasmus Mundus Heritage Program)	One Dual Degree student from Electrical Engineering Dept.
11.	Technical University of Denmark, Denmark	Three Dual degree students from Chemical Engineering Dept., one Dual degree student from Aerospace Engineering Dept., one Dual degree student from Mechanical Engineering Dept., and one B.Tech. student from Civil Engineering Dept.
12.	Technical University of Munich, Germany	Two Dual degree students from Mechanical Engineering Dept. and Electrical Engineering Dept. respectively.
13.	Technion-Israel Institute of Technology, Israel	One B.Tech. student from Mechanical Engineering Dept.
14.	Telecom Ecole de Management, France	Two M.Mgt. students from SJM School of Management
15.	Telecom ParisTech, France	Three B.Tech. students from Electrical Engineering Dept.

16.	The Cooper Union for the Advancement of Science and Art, USA	One Dual degree student from Chemical Engineering Dept., and two B.Tech., students from Chemical Engineering Dept., and Electrical Engineering Dept., respectively.
17.	University of Quebec at Trois Rivieres, Canada	Two Ph.D. students from Energy Science and Engineering Dept.
18.	University of Toronto, Canada	One B.Tech. student from Electrical Engineering Dept.

Foreign Language courses: Following language courses for the students and staff of IITB in the Autumn and Spring semester were organised :-

- 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)
- Italian (in association with University of Pavia, Italy)
- Mandarin (in association with Embassy of Taiwan, New Delhi)

The courses were conducted by the native speakers of these languages.

BRICS Global University Summit 2015 (GUS) at Russia

IIT Bombay participated in the BRICS Global University Summit (GUS) held at Moscow State Institute of International Relations (MGIMO-University) on October 28, 2015 in Moscow.

Prof. Rajiv Dusane, Dean (IR) along with Prof. D. Arcenev, Vice Rector IR and other officials in Peter the Great St. Petersburg Polytechnic University, Russia BRICS Global University Summit 2015

Meeting between IIT Bombay and following Institutes/universities were held during October 26-28, 2015 in Russia:

- At the Skolkovo Institute of Science and Technology, held discussion with the Rector, Prof. Edward F. Crawley on mobilising more faculty exchange programs and research workshops and other scopes of collaboration.

- Peter the Great St. Petersburg Polytechnic University, held discussion with the Vice Rector, Prof. D.Arcenev and Head of International Office, Prof. V. Khizhniak and Deputy Head of International Educational Project Office, Prof. Olga Emelianova, on starting the Summer School program for the students and faculty exchange mobility for more joint research projects.

- Lomonosov Moscow State University held detailed discussion with Prof. A. Kazansky to mobilize the student exchange program and active participation in Indo-Russian joint project proposal calls by DST/UGC and RFBR/RSF.

- Dean International Relations, IITB, also held a discussion meeting with functionaries from Novosibirsk State University on possible collaborating in capacity building of their faculty and student exchange program.

IIT Bombay delegation visits Bangladesh to promote DAAD Scholarships

In an endeavour towards creating better awareness on educational opportunities available at IIT Bombay for students at postgraduation and doctoral levels and forging collaborative relationships with higher educational institutions in Bangladesh, a team of senior officials from IIT Bombay and representatives from DAAD (German Academic Exchange Service) visited Bangladesh during January 10-14, 2016. IIT Bombay delegation included Prof. Devang V. Khakhar, Director, Prof. Narayan Rangaraj, Dean (Academic Programme) and Prof. Rajiv Dusane, Dean (International Relations). The High Commission of India in Dhaka organized an interactive session on January 11, 2016 for the students of Bangladesh. This was a unique opportunity for the students to meet and get their queries answered from IIT Bombay officials on academic programmes, infrastructural facilities, accommodation and financial aid available for the students.

DAAD has introduced scholarships for Bangladeshi and Nepali students, for pursuing M.Tech. in Engineering Systems, Biomedical Engineering, Environmental Science and Engineering, Water Resource Engineering and Technology and Development and PhD in following research areas: Renewable Energy, Climate Change, Health, Biodiversity and Good Governance at IIT Bombay. There would be 15 such scholarships available for M.Tech. aspirants that will cover cost of education, air fare from home country to India, health insurance, annual study and research subsidy and will also include a monthly stipend. DAAD will be offering 5 scholarships to students enrolling for PhD programmes that will include admission and tuition fees, air travel, annual study and research subsidy, final thesis subsidy and a monthly allowance.

Russian-Indian Network of Institutions of Higher Education

Russian-Indian Network of Institutions of Higher Education (RIN) was formed on May 8, 2015 by the signing of an agreement between 21 Russian and nine Indian Institutes in Moscow during the state visit of Hon'ble President of India Mr. Pranab Mukherjee.

The first meeting of the RIN was held at IIT Bombay on February 11-12, 2016. The meeting was attended by nine Russian universities and 11 leading IIT's from India. The main objectives of the event were to discuss the problems and prospects of cooperation between higher education institutions of India and Russia in the field of education, science and technology; to develop mechanisms of joint projects and programs implementation, and identification of an action plan for 2016-2017.

IIT B - Indiana University School of Public and Environmental Affairs Workshop, February 2016 at Indian University Bloomington, USA

The IITB-IU-SPEA combined faculty workshop held in Oak Room, Indiana Memorial Union, Indian University Bloomington, USA during February 24-26,

2016, was the second of the series, with the previous one being held at IIT Bombay in May, 2015. Following faculty members were present at the workshop from IIT Bombay: Prof. Eldho T.I., Department of Civil Engineering; Prof. R. Nagarajan, Centre for Studies in Resources Engineering; Prof. G.N. Jadhav, Department of Earth Sciences; Prof. G. Haripriya, Department of Humanities and Social Sciences and Prof. Munish Chandel, Centre for Environmental Science and Engineering.

IITB delegation team visited of various departments and labs in IU, Bloomington during February 23-24, 2016 and had fruitful interaction with various IU-SPEA faculties. The workshop started on 25th February and had invited technical research presentations from faculties of both institutions. From IU-SPEA, 17 faculty members from various departments participated in the workshop led by Exe. Assoc. Dean (SPEA) and Prof. Phil Stevens (SPEA).

During the three sessions of the workshop, the IITB delegation gave presentations on the following topics:

- Drought vulnerability assessment using exposure, sensitivity and adaptive capacity – an integrated resources based approach.
- Resource recovery from municipal solid waste and wastewater systems.
- Climate change and urban transportation system.
- Sustainable Water Resources Management & Hydrological Impacts of Climate Change on Indian River Basins.
- Geomorphology of Mumbai and surrounding areas to get natural water supply to Mumbai.
- Importance of temperature gradient in case of tiny fluid inclusions in host mineral of quartz and its applications in geology.
- Measuring Sustainability.

Topics covered in the presentations by IU-SPEA participants included:

- Network-Enabled Approaches to studying Land-Atmosphere Interactions.
- Simulating vegetation controls on hurricane-induced shallow landslides with a distributed ecohydrological model.
- New methods for monitoring food security and vulnerability in smallholder farming systems: research examples from Kenya and Zambia.
- Hydrogeochemistry: The Past 25 and the Next 25 Years.
- Monitoring water quality in agricultural landscapes.
- Implications of a changing climate on water resources in the western United States.
- Environmental Policies for Light Duty Vehicles in the US: An Up to Date Modelling Approach.
- A dynamic approach to the Human Development Index.
- A New Tool for Sub-State Modelling of Energy and Climate Policy: The Indiana Scalable Energy and Economy Model.
- Working with students to review and improve conservation programs.
- In-stream Nitrogen Processing and Dilution in an Agricultural Stream Network.
- Microbial Methane Production from Coal and Coal Waste.
- Tapping perceptions of water systems.

On the first day of the workshop, some of the possible collaboration areas such as "water resources and climate change issues and policies", "water management issues" and "environmental management" were identified as common areas of interests to IITB and IU-SPEA. At the end of the workshop, various ideas on "Way Forward for Future Collaborations" were discussed. Both IITB and SPEA faculties summarized the various areas of possible collaborations. The possibility of collaboration through faculty exchange and PhD guidance from both sides was discussed. Possible associations through research projects sponsored by various agencies such as "Indo-US Foundation" were discussed. Some of the areas of common research/ project interests identified include: "Environmental Sustainability & Policy", "Water Resources and Climate Change Issues and Policies", "Water Management & Drought Related Issues" and "Environmental & Waste Management".

Also, the possibility of offering short term courses (of one/ two week durations) and teaching of semester-wide courses were discussed. Both IIT Bombay and IU-SPEA Faculty showed interest in collaboration

through offering courses, supervising PhD students and research work and publication through combined research projects. Based on the earlier IITB workshop and present workshop, further collaborative efforts shall be strengthened through MOU between IITB and IU-SPEA.

The workshop was concluded with thanks to IU-SPEA and IIT Bombay authorities for providing necessary logistics, infrastructure, travelling support to IITB faculty and other facilities to successfully organize the workshop.

Alumni & Corporate Relations

The Dean Alumni and Corporate Relations (ACR) Office integrates two strategic thrusts for IIT Bombay. One is nurturing and enhancing alumni relations and other is the same with corporations. The Institute requires substantial financial resources for continued modernization of facilities. Although the Government of India continues to be the primary source of funds for the Institute, the Office of Dean ACR performs the important task of raising additional resources from the alumni and other well-wishers of IIT Bombay.

This year a sum of Rs. 39.28 crores was received by the Institute through donations from alumni and corporations. The major donors, among others, were Sir Dorabji Tata Trust, Portescap India Private Limited, SAP, CISCO, GE, Applied Materials and Class of 1990.

The major activities for which these donations were received are as under:

Institute Development Fund: This fund primarily caters to the needs of the Institute such as modernisation and the establishment of new academic, research and campus infrastructure.

Young Faculty Awards (YFA): In an endeavour to enable IIT Bombay to attract quality faculty, the alumni have instituted the Young Faculty Awards programme, which provides a grant of Rs. 1 lakh per year for the first four years to newly-recruited, young faculty members. This grant acts as an incentive to the prospective faculty at IIT Bombay.

Chair Professorship: The Chair Professorship is a distinguished academic position of the Institute. Besides acting as a recognition for the permanent faculty of the Institute, it is also used to attract outstanding academicians to join the institute as visiting faculty or permanent faculty. Each Named Chair is supported by an endowment created from a donation to the Institute.

Hostel Development: The 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 former hostels. This activity is run exclusively through the alumni support and contributions. The key goals of HATS are as follows: (a) Improve hostel infrastructure and facilities (b) Assist the current and retired mess workers (c) Increase interaction between the alumni and students (d) Empower students to improve their living conditions under the aegis of Make Hostel My Home (MHMH) and (e) Organize reunions in each hostel on the Alumni Day.

Student Development:

Scholarships: One way to nurture excellence amongst students is by awarding scholarships to deserving candidates. The scholarships funded by the alumni, trusts and corporations supplement the scholarship available from government funds and enable the Institute to provide support to a larger number of deserving students. During the year 2015-16, over 300 scholarships of varying amounts were granted.

Awards and Prizes: As every year, about 50 awards and prizes of varying amounts and forms (certificates, medals, etc.) were given away during 2015-16.

Major Events:

(a) Alumni Day & Distinguished Service Awards Presentations: The Alumni Day, celebrated on December 27, 2015, saw four of the alumni, who have contributed in a notable and sustained manner to the progress of the Institute, being honoured with the Distinguished Service Award. Their names are :

Mr. Pramod Chaudhuri, B.Tech. (1971),

Mechanical Engineering
Mr. Ashok Kalbag, B.Tech. (1974), Mechanical Engineering
Mr. Rajesh Radhakrishnan, B.Tech. (1988), Metallurgical Engineering
Mr. Abhay Sawant, B.Tech. (1988), Electrical Engineering

Distinguished Service Awardees

The Silver Jubilee Batch of 1990 presented their Class Legacy Project and pledged to contribute Rs. 6.5 crores towards the Legacy Project. Mr. Pramod Chaudhury also pledged to contribute Rs.1 crore to the Institute.

The Jade Jubilee reunion batch (1980) and the Decennial batch (2005 also addressed the meet on December 27, 2015.

(b) Foundation Day: The 57th Foundation Day of the Institute was celebrated on March 10, 2016. During the function, 13 alumni were honoured with the Distinguished Alumnus Award and six alumni with the Young Alumni Achievers Award. The Distinguished Alumnus Award is conferred on those alumni who have reached positions of eminence in the areas of business, academics, research, government, public service and entrepreneurship. The Young Alumni Achiever Award is presented to those who have shown outstanding achievements in their chosen fields of work and are below 40 years of age.

The recipients of the Distinguished Alumnus Award are as follows:
Dr. Cyrus Mehta,
B. Tech. (1967), Civil Engineering
Dr. Krishna Chivukula,
B.Tech. (1968), Mechanical Engineering
Mr. Mohan Kavrie, B.Tech. (1971), Civil Engineering
Dr. Hemant Kanakia,
B.Tech. (1976), Electrical Engineering
Prof. Shantikumar V. Nair,
B.Tech. (1976), Metallurgical Engineering
Prof. Madan Rao,
M.Sc. (1982), Physics
Dr. Girish Deodhare,
B.Tech. (1984) & M.Tech.(1986), Electrical Engineering
Prof. Rangarajan Pitchumani,
B.Tech. (1986), Mechanical Engineering
Prof. Moses Charikar,
B.Tech.(1995), Computer Science & Engineering

The following were presented with the Young Alumni Achievers Award:
Dr. Dhananjay Gore, B.Tech.(1998), Electrical Engineering
Dr. Nisheeth Vishnoi, B.Tech. (1999), Computer Science & Engineering

Chief Guest Prof. Sandip Trivedi, Director of TIFR, Dr. Anil Kakodkar, Former Chairman of BoG, IITB and Former Secretary of Department of Atomic Energy, Prof. S.P. Sukhatme, Former Director of IITB and Former Chairman of AERB, Prof. Devang V. Khakhar, Director of IITB, Prof. Ravi Sinha, Dean (ACR) with the awardees

(c) Institute Valedictory Function: The Valedictory Function for the graduating students was organised on April 30, 2015. Prof. Juzer Vasi, Department of Electrical Engineering, was the Chief Guest of the function and addressed the graduating class of 2015. More than 600 graduating students also took the 'Give One for IIT' pledge, wherein they pledged to donate 1 % of their income to the Institute to support its various activities.

(d) Student Alumni Meet: The fifth edition of the flagship of the Student Alumni Relations Cell (SARC) called 'Student Alumni Meet' (SAM) was held during October 3-4, 2015. SAM acts as a platform to facilitate Student-Alumni interactions and enable students to avail the benefits of IIT Bombay's pool of experienced alumni. Talks on 'Being an Entrepreneur' were delivered by Mr. Deepak Birewar and Mr. GKK Singh. A talk on 'Beyond the Horizons' was held on alternative career choices. Tech Expo was also organised during the meet, with over 200 students showcasing their projects and research. On the second day 'Social Sector Networking' – an event where founders of well known startups like Saral Designs and rural activists like Mr. Deepak Gupta delivered the talks in the session. SAM concluded with Alumni Sports Meet (ASM).

(e) UK Trade & Investment Minister visit IIT Bombay: The Right Honourable Lord Francis Anthony Aylmer Maude visited the Institute on September 9, 2015. He delivered an interactive session on the increasing opportunities for collaboration between British and Indian industries and entrepreneurs. The sesion was followed by a talk on opportunities offered by British universities which was given by professors from various British universities and research centres. Lord Maude was accompanied by officials from the British Consulate in India who also participated in the Q&A session. He acknowledged that Indian students were respected all over the world and that many of the emerging start-ups in Britain were headed by people of Indian origin.

(f) US Roadshow by IIT Bombay delegation: An official delegation from IIT Bombay consisting of Prof. D.V. Khakhar, Director, Prof. P.M. Mujumdar, Deputy Director (Finance & External Affairs), Prof. Ravi Sinha, Dean (Alumni & Corporate Relations), Prof. J.K. Verma, Dean (Faculty Affairs), visited several universities, companies, alumni and other well-wishers during October 3-12, 2015. The major highlights of the roadshow are given below:

1) The Faculty Alumni Network (FAN) Symposium, held during the US Roadshow, was hosted at Santa Clara, California, on the theme "Advanced Manufacturing" and was attended by around 50 participants.

During the symposium, the delegation held interactions with the participants and clarified their doubts regarding the academic activities at IIT Bombay and the expectations from new faculty members.

2) Meetings with Universities: During the roadshow, the delegates visited the University of Washington at Seattle, University of Washington at Bothell, University of Washington Tacoma, University of California Berkeley, Rice University, University of Houston and Cooper Union and held meetings to discuss the university leadership, review of MoU, discussion on possible MoU, interactions with alumni and research students who may be interested in faculty positions at IIT Bombay.

3) Meetings with Companies & Research Organisations: The IIT Bombay delegation participated in meetings with a large number of companies and research organisations during the roadshow. These include Microsoft, Boeing, Facebook, Halliburton and Zentec. The discussions identified topics of interest to these organisations and reviewed ongoing collaborations.

4) Alumni Chapter Events: Chapter meetings involving alumni get-together were organised by the following chapters during the roadshow: Seattle, New York and Bay Area Chapter. During the chapter meetings, an update of the current activities of the Institute was presented. The opportunities of engagement of the alumni with the Institute were also highlighted during the chapter meetings. There was tremendous interest amongst the alumni to participate in the development of the Institute. The opportunities that were discussed included interactions/mentoring students, offering internship opportunities to students, partnering faculty members in their research activities and delivering expert lectures at IIT Bombay.

5) Faculty Alumni Network & Distinguished Alumni Meet: The Faculty Alumni Network (FAN) India & Distinguished Alumni Meet (DAM) were held in Goa, during January 16-17, 2016. Annual Distinguished Alumni Meet is an initiative that brings together IITB's distinguished alumni who have contributed and have been acknowledged for their distinguished services to the society at large. The meet is held annually to plan the strategic growth of the institution in the future years. The meet was preceded by Faculty Alumni Network India Symposium.

(j) Lecture Series: The following lectures were organised with the involvement of Dean ACR Office.

GL Mehta Memorial Lecture: The IIT Bombay ICICI Bank GL Mehta Memorial Lecture was delivered by Prof. Kaushik Basu, Senior Vice President (Development Economics) and Chief Economist of the World Bank on August 26, 2015. The title of the lecture was "Can India Lead Global Growth?"

Girish Sant Memorial Lecture: The Girish Sant Memorial lecture was delivered by Dr. Sunita Narain, Centre for Science and Environment, New Delhi on "The energy question for India? Clean energy or energy access?" in October 2015.

Indira Foundation Distinguished Lecture: The Indira Foundation Distinguished Lecture was delivered in October 2015 by Prof. Avi Wigderson of Institute for Advanced Study, Princeton University, USA on "The "P vs. NP" problem: Efficient computation, Internet security and the limits to human knowledge".

Radhika Rajan Leadership Lecture: The second Radhika Rajan Leadership Lecture was delivered on March 2, 2016 by the well-known mountaineer Padmashree Ms Santosh Yadav on "Motivation, Team Building, Leadership and Risk Management – An Everest Conqueror's Story".

Prof. K.C. Khillar Lecture in Chemical Engineering: This annual Institute Distinguished Lecture in Chemical Engineering in memory of Prof. K.C. Khilar was delivered by Prof Prabhu Nott, IISc, Bengaluru on "How similar to fluids are collections of grains? Similar and very different" in April 2015.

Tinkerer's Lab Lecture Series: The first lecture in the Tinkerer's Lab lecture series was held on March 12, 2016 by Distinguished Alumnus Dhananjay Saheba, Managing Director of iJunxion. The topic for the lecture was "Evolution of the Telecom industry".

The second lecture in the Tinkerer's Lab lecture series was delivered on March 13, 2016 by Dr. Henry Throop, Planetary Science Institute in Tucson, Arizona, USA. The topic for the lecture was "NASA New Horizons Mission and Beyond".

The third lecture in the Tinkerer's Lab lecture series was held on April 7, 2016 by alumnus Mr. Sameer Katdare, Vice President (Technical), Alkly Amines Chemicals Ltd. The topic for the lecture was "Engineering Lessons from a disaster ¬ Bhopal".

Institute Events

53rd Convocation

The 53rd Convocation of the IIT Bombay was held on August 8, 2015. Mr. Kailash Satyarthi, Nobel Peace Prize Laureate, was the Chief Guest and delivered the Convocation Address. On the ocassion Mr. Anand Mahindra, Chairman and Managing Director of Mahindra and Mahindra Limited, was conferred with Degree of Doctor of Science *(Honoris Causa)* for his extraordinary commitment in furthering the cause and growth of Automobile Industry, and for his significant contribution to the Social Development of India.

At the 53rd Convocation 2389 degrees were awarded : B.Tech. - 559, Dual Degree (B.Tech. & M.Tech.) - 271, M.Sc. (5 Yr. Int.) -24 , M.Sc. (2 Yr.) – 194, Dual Degree (M.Sc.-Ph.D.) - 8, M.Tech. - 620, M.Des. - 61, M.Phil. - 18, M.Mgt. - 79, PGDIIT (Exit) – 6 and PhD – 230, M.Tech.+Ph.D. - 12.

Mr. Anand Mahindra, Chairman and Managing Director of Mahindra and Mahindra Limited receiving Degree of Doctor of Science (*Honoris Causa*) at the 53rd Convocation of IIT Bombay

Medals

The President of India Medal was awarded to Mr. Ashwin R, B.Tech student from the Department of Aerospace Engineering, Institute Gold Medal was awarded to Mr. S. Vignesh, Dual Degree student from the Department of Electrical Engineering and the Dr. Shankar Dayal Sharma Gold Medal was conferred on Mr. Pravesh Vijay Kochar, B.Tech student from the Department of Electrical Engineering. Additionally, more students were presented with Gold Medals sponsored by donors.

57th Foundation Day

IIT Bombay celebrated its 57th Foundation Day on March 10, 2016. Prof. Sandip Trivedi, Director, TIFR, was the Chief Guest. The Institute honoured nine of its alumni with the Distinguished Alumnus Award-2016 and two with the Young Alum Achiever Award-2016. The “Prof. S.C. Bhattacharya Award for Excellence in Pure Sciences-2015” was conferred on Prof. C.P. Rao, Department of Chemistry, and the “Prof. H.H. Mathur Award for Excellence in Research in Applied Sciences-2015” was presented to Prof. Indradev Samajdar, Department of Metallurgical Engineering & Materials Science.

Mrs. Nag, wife of late Prof. Biswajit Nag, Former Director (1984-94), IITB with Dr. Anil Kakodkar, Former Chairman of BoG, IITB and Former Secretary of the Department of Atomic Energy, Prof. D. V. Khakhar, Director of IITB and Prof. Sandip Trivedi, Director of TIFR

The Foundation Day celebrations also witnessed the formal naming of the Main Auditorium, Victor Menezes Convention Centre (VMCC) after the name of Prof. Biswajit Nag, Former Director (1984-94), IITB in the presence of Prof. S.P. Sukhatme, Former Director, IITB and Former Chairman AERB and Mrs. Nag, wife of late Prof. Biswajit Nag, Former Director (1984-94), IITB.

Teacher's Day

The 57th "Teacher's Day" was celebrated on September 4, 2015. Prof. Vasudha Kamat, Vice Chancellor, SNDT Women's University, was the Chief Guest. The "Excellence in Teaching Award-2015", "IRCC Research & Industrial Consultancy Award-2014" and the "Dr. P. K. Patwardhan Technology Development Award-2014" were presented on the occasion.

Awards for Excellence in Teaching (2015), were presented to

- Prof. S.J. Gharpure, Department of Chemistry
- Prof. Mandar Inamdar, Department of Civil Engineering
- Prof. Pradeep Nair, Department of Electrical Engineering
- Prof. Madhu Vinjamur, Department of Chemical Engineering
- Prof. M.J.N.V. Prasad, Department of Metallurgical Engineering and Materials Science
- Prof. N.N. Viswanathan, Department of Metallurgical Engineering and Material Science
- Prof. Srikanth Srinivasan, Department of Mathematics
- Prof. Kiran Kondabagil, Department Biosciences & Bioengineering
- Prof. G.K. Lahiri, Department of Chemistry
- Prof. V.D. Sharma, Department of Mathematics

Dr. P. K. Patwardhan Technology Development Award (2014) was awarded to Prof. J.K. Nayak & his team members, Department of Energy Science and Engineering.

IRCC Research & Industrial Consultancy Awards (2014)

IIT Bombay Research Paper Award (2014)

- Prof. Dulal Panda, Department of Biosciences & Bioengineering.
- Prof. Debabrata Maiti, Department of Chemistry.
- Prof. Prasenjit Ghosh, Department of Chemistry.

- Prof. R.S. Jangid, Department of Civil Engineering
- Prof. Anil Kottantharayil, Department of Electrical Engineering

IIT Bombay Review Paper Award (2014)

- Prof. Sanjeeva Srivastava, Department of Biosciences and Bioengineering
- Prof. R. Murugavel, Department of Chemistry

IIT Bombay Young Investigator Award (2014)

- Prof. Maheshwaran Shanmugam, Department of Chimistry
- Prof. Suryanarayan Doolla, Department of Energy Science and Engineering
- Prof. Amartya Mukhopadhyay, Department of Metallurgical Engineering and Material Science

IIT Bombay Industrial Impact Award (2014)

- Prof. Ashish Juneja, Department of Civil Engineering

Vanamahotsav 2015 was celebrated on July 4, 2015. Saplings were planted by school students and teachers of Kendriya Vidyalaya and Campus School (both located within IIT Bombay campus) and the students, faculty and staff of the Institute, at both the schools as well as at the fringe of several roads on the campus.

National Centre of Excellence in Technology for Internal Security

The new centre, National Center of Excellence in Technology for Internal Security (NCETIS), was launched by Mr. Alok Joshi, Chairman, NTRO on September 21, 2015.

Conferences/Colloquia/ Lectures/Seminars

Many conferences and lectures were organised during the past year. Some of them have been mentioned earlier and few are listed below:

Prof. Prabhu R. Nott, Department of Chemical Engineering, IISc Bangalore, spoke on "How similar to fluids are collections of grains? Similar, and very different", at an Institute Colloquium on April 16, 2015

Prof. Alexander H. King, Director of Critical Materials Institute, Ames Laboratory, US Department of Energy, lowa, USA, spoke on "Critical Materials for Energy System", at an Institute Lecture on April 27, 2015.

Prof. Madhu Sudan, Microsoft Research New England, United States, spoke on "Reliable Meaningful Communication", at an Institute Colloquium on June 8, 2015.

Prof. Kenji Hata, Director Nanotube Application Research Center, AIST, Japan, spoke on "The Long and Winding Road Towards Single-Walled Carbon Nanotube Industrialization", at an Institute Colloquium on June 10, 2015.

Dr. Samir Mitragotri, Director, Center for Bioengineering, Professor, Department of Chemical Engineering, University of California, Santa Barbara, CA, USA, spoke on "Innovative Systems for Effective Deliver of Therapeutics", at an Institute Colloquium on July 16, 2015.

Air Marshal B.N. Gokhale, PVSM, AVSM, VM (Retd.), Former Vice Chief of the Air Staff, Consultant to the Principal Scientific Adviser, Government of India, spoke on "Safety in the High Growth Sector of Civil Aviation in India", at an Institute Colloquium on July 22, 2015.

Prof. Vikram Patel, International Mental Health and Wellcome Trust Senior Research Fellow in Clinical Science London School of Hygiene and Tropical Medicine, UK, spoke on "The Mockery of Science in Public Policy: The case of suicide in India", at an Institute Colloquium on August 21, 2015.

Prof. Kaushik Basu, Senior Vice-President and Chief Economist, The World Bank, spoke on "Can India Lead Global Growth?", at the GL Mehta Memorial Lecture on August 26, 2015.

Prof. A.K. Sood FRS, Department of Physics, Indian Institute of Science Bangalore, spoke on "The Rise of Two

Dimensional Nanosystems", at Professor C.N.R. Rao Lecture Series on Nanoscience and Nanotechnology on September 22, 2015.
Dr. Sunita Narain, Director General, Centre for Science and Environment, New Delhi, spoke on "The energy question for India? Clean energy or energy access?", at the third Annual Girish Sant Memorial Lecture on October 9, 2015.

Dr. Srikanta Mishra, Institute Fellow and Senior Research Leader for Energy & Environment, Battelle Memorial Institute, United States, spoke on "Shale Gas Development: Energy Supply Game Changer, or Environmental Quagmire?", at an Institute Colloquium on October 13, 2015.

Prof. Avi Wigderson, School of Mathematics, Institute of Advanced Study, Princeton, spoke on "The 'P vs. NP' problem: Efficient computation, Internet security and the limits to human knowledge", at the third annual 'Indira Foundation Distinguished Lecture' on October 28, 2015.

Dr. V.V.N. Kishore, Former Professor and Head, Department of Energy and Environment, TERI University, spoke on "Experiments with Sustainable Technologies – A personal account", at the Prof. C.V. Seshadri Memorial Lecture on November 5, 2015.

Prof. Jonathan Agar, Professor of Science and Technology Studies, University College London, United Kingdom, spoke on "What are the big themes of the history of twentieth century science?", at an Institute Colloquium on January 7, 2016.

Dr. Pervez Hoodbhoy, Distinguished Professor of Physics and Mathematics and Head, Physics Department, Forman Christian College, Qaid-e-Azam University, spoke on "Is The Scientific Method Outdated?", at an Institute Colloquium on January 12, 2016.

Prof. Anuj Dawar, Professor of Logic and Algorithms, University of Cambridge, UK, spoke on "Abstraction, Complexity and Symmetry in Computation", at an Institute Colloquium on January 25, 2016.

Prof. S.P. Kothari, Gordon Y. Billard Professor of Accounting and Finance and **Director, MIT India Program**, MIT Sloan School of Management, United States, spoke on "What should India do to accelerate growth", at an Institute Colloquium on February 1, 2016.

Prof. Douglas Alien, Professor of Philosophy, The University of Maine, USA, spoke on "Is Gandhi Significant for India in 2016?", at an Institute Colloquium on February 10, 2016.

Dr. Clement Sanchez, Laboratoire de Chimie de la Matiere Condensee de Paris, College de France, spoke on "Biomimetism and Bioinspiration: Sources of knowledge to create new materials", at an Professor C.N.R. Rao Lecture Series on Nanoscience and Nanotechnology on February 29, 2016.

Ms. Santosh Yadav, Everest Foundation, spoke on "Motivation, Team Building, Leadership and Risk Management – An Everest Conqueror's Story" at the Second Annual Radhika Rajan Leadership Lecture on March 2, 2016.

Justice B.N. Srikrishna, Retired Judge, Supreme Court of India, spoke on "The Indian Constitution", at an Institute Colloquium on March 12, 2016.

Mr. Bill McDermott, Chief Executive Officer and a member of the Executive Board of SAP SE, spoke on "A Journey from Corner Store to Corner Office", at an interactive session with students on March 17, 2016.

Department of Aerospace Engineering, IIT Bombay has organised First International Workshop on Venus Exploration Project (VEP) using LTA Technologies on May 12, 2015.

Industrial Design Centre, IIT Bombay jointly with CII and Department of Scientific & Industrial Research, Government of India, organised a two-day Conclave for MSMEs on New Product Development during September 11-12, 2015.

The Department of Metallurgical Engineering and Materials Science, organised the 17th Asian Pacific Corrosion Control Conference (APCCC-17) during January 27-30, 2016.

The Center for Environment Science & Engineering organised a workshop on "Appropriate Technologies for Treating and Disposing Municipal Solid Waste" on February 25, 2016.

IIT Bombay organised four-day conference on 'DrupalCon Asia 2016' during February 18-21, 2016. The conference brought together thousands of people from across the globe who use, develop, design and support the Drupal platform.

The Psychophysiology Laboratory of the Department of Humanities & Social Sciences, organised a National Seminar on "Information, Communication and Technology (ICT) and 21st Century Policing: Challenges and Potentialities" on February 27, 2016.

HINDI CELL

Hindi Cell is actively engaged in providing support for implementation of Hindi in the Institute. The Institute's circulars, office orders, registers, forms, visiting cards, signboards, and degree certificates are prepared in bilingual form. Hindi workshops titled "Correspondence in Hindi", "Noting and Drafting in Hindi", "Basic Hindi Translation" and "Hindi Typing Skill" etc. were conducted during the year for staff members of the Institute. A lecture by Dr. Jaiprakash Kardam, Director, Central Hindi Training Institute and Central Translational Bureau was organised for senior officers. The cell continues to send Hindi synonyms of the administrative terms through the Institute's email (GPO).

This year, 24 staff members of the Institute appeared for Hindi Typing Exam, conducted by the Hindi Teaching Scheme and 12 staff members were nominated for "Parangat", a newly introduced training programme of Hindi Teaching Scheme, Department of Official Language, Ministry of Home Affairs.

"Hindi Pakhawada" was celebrated during September 1-14, 2015, where competitions in essay writing, dictation, general knowledge, Hindi translation and singing competition were organised. Awards to Institute employees for significant contributions in Hindi implementation were conferred during the event. Staff members were encouraged to use Hindi in their routine work and were honoured for their significant contributions.

Regular meetings of the Official language implementation Committee of the Institute were conducted during the year for increasing the use of Hindi in official work.

An exhibition of Hindi books was held during Hindi Pakhawada

Departments/ Centres/ School and Interdisciplinary Groups

Science & Engineering Departments:

The engineering departments at IIT Bombay offer undergraduate and postgraduate programmes leading to B.Tech, M.Tech or PhD degrees. The five-year Dual Degree programme pioneered by the Institute in 1996, offers a B.Tech degree in a basic discipline and an M.Tech degree with specialization in a field on its completion. This programme is now offered by all engineering departments. The Science departments at IIT Bombay were set up to provide basic grounding in Science and Mathematics to engineering students. However, apart from providing core courses in undergraduate programmes, these departments also offer postgraduate courses which lead to MSc or PhD.

- Aerospace Engineering
- Biosciences & Bioengineering
- Chemical Engineering
- Chemistry
- Civil Engineering
- Computer Science and Engineering
- Earth Sciences
- Electrical Engineering
- Energy Science and Engineering
- Mathematics
- Mechanical Engineering
- Metallurgical Engineering and Materials Science
- Physics

Arts and Humanities Department:

The Arts and Humanities Department at IIT Bombay were set up to familiarizing the students of science and technology studies with the broader social, cultural, economic, ethical and humane concerns underlying social change. The advanced courses offered at the PG level aim at cultivating critical thinking and enhancing the analytical capabilities of students engaged exclusively with the study of these concerns. However, these departments offer postgraduate courses which lead to MSc, M.Phil, M.Des, and PhD.

- Humanities and Social Sciences
- Industrial Design Centre

School:

The school offers postgraduate programmes in new, emerging areas and aim to expand the scope of the academic programmes in the Institute. They have been set up with substantial support from IIT Bombay alumni and industry.

- Shailesh J. Mehta School of Management

Centre/Interdisciplinary Groups:

The centres and interdisciplinary groups offer postgraduate programmes and reflect the Institute's multi-disciplinary approach and emphasis on staying with leading-edge technologies in its academic approaches.

- Centre for Environmental Science & Engineering
- Centre of Studies in Resources Engineering
- Centre for Technology Alternatives for Rural Areas
- Centre for Formal Design and Verification of Software
- Centre for Urban Sciences and Engineering
- Centre for Research in Nanotechnoloogy and Science
- Education Technology
- Industrial Engineering and Operations Researchers
- Systems and Control Engineering
- Corrosion Science and Engineering
- Climate Change Studies

Aerospace Engineering

Established in 1966-67 as the Department of Aeronautical Engineering, this department was renamed the Department of Aerospace Engineering in 1992. The department has a total of 18 faculty members. The academic programs of the department focus mainly on science and engineering/ technology behind flight vehicles and their sub-systems. The curriculum focuses on fundamentals of fluid dynamics, propulsion, structural mechanics, vehicle dynamics, control and guidance etc., as well as applications of these fundamentals to the analysis and design of aerospace vehicles.

Academic Programmes: The department runs strong undergraduate and graduate programs in Aerospace Engineering and carries out basic and applied research as well as continuing education activities in various sub-disciplines of Aerospace Engineering such as Aerodynamics, Propulsion, Structures, Dynamics and Control, Design and Systems Engineering. The academic programs include the four year B. Tech degree program, the five year Dual Degree program, the two year M. Tech program and the Ph.D. program. The department has around 350 students, out of which about 120 are graduate student and 230 are undergraduate students.

	Student Intake	Degrees Awarded
B.Tech	56	42
M.Tech	40	53
DD(B.Tech-M.Tech)	-	21
PhD	15	2

R&D Activities: During the year 2014-2015, the department has been actively engaged in teaching, research and other professional activities e.g. workshops, seminars, industry interactions, projects, professional development course modules etc. As a result of these activities, following were the publications during the year in the department:

	Sponsored Projects	Consultancy Projects
New Projects	6	7
Ongoing	24	71
Completed	11	48

During the year 2014-2015, the department has supported many student technical activities such as Mars Rover, Student Satellite etc. and students have also been engaged in national and international competitions as participants/ organizers. Notable among the various activities that have been carried out during 2014-2015 are: 'Methodology for generating optimized contoured end walls in an axial flow compressor cascade', developed by PhD student Mahesh Varpe working with Prof. A.M. Pradeep and 'New model for turbulent heat flux prediction for application to supersonic and hypersonic flows with shock waves', by researchers from the Hypersonic CFD group, working under the guidance of Prof. Krishnendu Sinha.

Department of Biosciences & Bioengineering

The Department of Biosciences and Bioengineering comprises of two broad areas representing Biotechnology and Biomedical Engineering. The department aims to create an ambience for the efficacious pursuit of scholarly activity in research and education, and endeavours to produce the leaders of tomorrow in this field.

Academic Programs: The academic programs currently consist of the DBT supported M.Sc Biotechnology program, M.Tech. in Biomedical Engineering program, and the PhD program. All these programs are well regarded nation-wide.

	Student Intake	Degrees Awarded
MSc	28	20
M.Tech	26	20
DD(MSc+PhD)	4	-
PhD	20	20

R&D Activities: Research in the department encompasses both basic biology and applied bioengineering topics. Three CEP programs were conducted and 30 different S&T events were conducted/ participated in. The table below lists the number of papers published during the year:

	Sponsored Projects	Consultancy Projects
New Projects	31	-
Ongoing	100	3
Completed	9	-

Several new cutting-edge facilities were added over 2015-16, such as Ultracentrifuge facility, to name a few.

Extensive interactions with various groups in Electrical Engineering, Chemical Engineering, Aerospace Engineering, Computer Science, Chemistry and Mathematics made the departmental research activities truly interdisciplinary

Department of Chemical Engineering

One of the largest departments in the Institute in terms of number of faculty members, students enrolled and research funding received, this department has in its roll 38 core faculty, 9 Emeritus Fellow/ Professor Emeritus/Adjunct/Visiting faculty and 14 Post-doctoral fellows/ Research Associates.

Academic Programmes: The academic programmes offered by the department are the B.Tech. (4-years), M.Tech (duration 2-years), Dual Degree (5-year) and PhD programme (~5-year). The department has a total of 793 students (541 B.Tech/ Dual Degree, 54 M.Tech and 198 PhD students), 28 staff and ~150 research assistants.

	Student Intake	Degrees Awarded
B.Tech	124	93
DD (B.Tech + M.Tech)	-	39
M.Tech	53	14
PhD	33	29

R&D Activities: The Department has a strong focus on excellence in education and research. The diverse research areas of the department, including Biological Systems Engineering, Soft Matter Engineering, Process Systems Engineering, Catalysis and Reaction Engineering, Thermodynamics & Molecular Simulations and Energy, Environment & Sustainability, has a strong focus in the subjects relating to Healthcare, Energy and Materials.

	Sponsored Projects	Consultancy Projects
New Projects	13	10
Ongoing	83	5
Completed	23	5

During 2015-16, the department received research grant from government and private agencies to the tune of Rs. 36.7 crore with 31 new sponsored projects and consultancy projects.

Department of Chemistry

From a small department that started in 1965, the Department of Chemistry at IIT Bombay has grown into a major centre for teaching and research in the area of chemical sciences in India. The department celebrated its Golden Jubilee Year during 2014-15. Today the department has 37 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.

Academic Programmes: The department offers B.Tech., Masters in Chemistry (2-years), B.S. in Chemistry (4-years), M.Sc. (2-years) and PhD programs. The department has introduced new four year B.S. programme in the golden jubilee year. The General Chemistry program of the department, consisting of two theory and two laboratory courses in the core curriculum of the first year B.Tech./Dual Degree M.Tech. programmes 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 B.S., M.Sc. and PhD degrees: 4-year BS with entrance through JEE, 2-years M.Sc. For post B.Sc. students with entrance through JAM and PhD in Chemistry.

	Student Intake	Degrees Awarded
BS (4-years)	27	33
M.Sc. (2-years)	40	36
DD (M.Sc. + PhD)	5	--
PhD	53	19

R & D Activities: The Department of Chemistry is involved in research problems of both basic and applied nature in frontier areas through sponsored research projects, and as part of the M.Sc. and PhD programs. Major areas of research activities carried in the department include 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.

	Sponsored Projects	Consultancy Projects
New Projects	104	6
Ongoing	44	14
Completed	20	4

Several eminent personalities visited the department during the year and gave lectures. Prof. Sandeep Verma from IIT Kanpur gave Professor A.K. Lala Memorial Lecture on May 15, 2015 whereas Dr. K. Nagarajan from Hikal Ltd. gave Professor K.D. Deodhar Memorial Lecture on March 30, 2016.

Department of Civil Engineering

The Department of Civil Engineering has been a part of IIT Bombay since its inception in 1958. Over the year, the department has grown tremendously, and is now recognised as one of the major engineering department 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, academic and research institutions.

Academic Programmes: The department is running M.Tech and PhD programmes with its traditional B.Tech programme in Civil Engineering. The much needed M.Tech programme in the area of construction technology and management will commence from the academic year 2016-2017.

	Student Intake	Degrees Awarded
B.Tech	117	95
DD (B.Tech + M.Tech)	-	6
M.Tech	54	50
M.Tech + PhD	34	3
PhD	-	17

R&D Activities: The department has strong focus in the research areas of Structural Engineering, Geotechnical Engineering, Water Resources Engineering, Transportation Systems Engineering, Remote Sensing, Ocean Engineering and Construction Technology and Management. It has 17 high end teaching and research laboratories in all these areas. The department is actively involved in basic and applied research and consultancy and provides high quality technical advisory support through various R & D projects and consultancy to various organizations.

	Sponsored Projects	Consultancy Projects
New Projects	16	-
Ongoing	59	-
Completed	8	-

During the year 2015-16 the department has conducted 13 quality improvement and continuing education programmes for the academicians and field engineers. The department has also conducted a two-day 'Young Geotechnical Engineers' Symposium titled 'Finite Element Method (YGESFEM 2015) during May 17-18, 2015, which saw a participation level of over 100 budding young researchers and professionals.

Computer Science and Engineering

The Computer Science and Engineering (CSE) department at the Indian Institute of Technology Bombay is the largest among CSE departments in any institute in India. The department has 44 faculty members, including one visiting faculty and one adjunct faulty.

Academic Programmes: The department offers Bachelor of Technology (B. Tech.), Master of Technology (M. Tech.), Dual Degree (B.Tech.-M. Tech.) and Doctor of Philosophy (PhD) programmes in Computer Science. The M. Tech. and PhD are post-graduate programmes, the B. Tech. is the undergraduate programme, while the Dual Degree (B.Tech.-M.Tech.) is a programme in which you come in at undergraduate level, stay for five years, and are awarded both a B. Tech. and an M. Tech.

	Student Intake	Degrees Awarded
B.Tech	121	85
M.Tech	113	102
PhD	18	12
PhD	15	2

R&D Activities: The research and teaching in the department spans a wide spectrum of areas including algorithms, animation, artificial intelligence, compilers, combinational optimization, computer and medical vision, data mining, embedded systems, formal methods, functional programming, e-commerce, graphics, databases, image processing, machine learning, mobile computing, natural language processing, object oriented systems, parallel and distributed processing, programming languages, reinforcement learning, query processing and optimization, real time systems, security, software engineering, systems, theoretical computer science, wireless and sensor networks and verification.

	Sponsored Projects	Consultancy Projects
New Projects	25	24
Ongoing	89	-
Completed	13	-

Department of Earth Sciences

The Department of Earth Sciences was constituted in 1982 from the erstwhile Geology Section of the Department of Civil Engineering of IIT Bombay (where an M.Sc. programme in Applied Geology was offered since 1964). The Department draws strength from the reputation of its 21 faculty members with specializations covering a wide spectrum of research areas in Geosciences, including both Geology and Geophysics. The faculty are actively engaged in both teaching and research and contribute in reputed international scientific journals and interact with national and international scientific organizations. The close links that the department enjoys with the industry and research organizations has worked towards elevating the level and quality of research work and facilities. The department boasts of sophisticated and excellent state-of-the-art laboratories and research facilities including two major national facilities -40Ar/39Ar Mass Spectrometer for Geochronology and Electron Probe Micro Analyzer (EPMA) for Mineral Chemistry. The department is a fine blend of Geology and Geophysics and offers academic programmes in various branches of Geosciences which attract the best students across the country making the department a leading and much sought-after institute for education and research.

Academic Programme: The Department offers academic programmes leading to M.Sc. (Applied Geology), M.Sc. (Applied Geophysics), M.Tech. (Geo-exploration), M.Tech. (Petroleum Geoscience) and Doctoral Degrees. An M.Sc. - PhD dual degree programme is also offered in Geology and Geophysics respectively. The department annually admits about 47 students in its M.Sc. programmes, about 38 in its M.Tech. programmes and about 20 students in its doctoral programme. All the core and elective courses included in the Geoscience programs

have been specifically designed to meet industry standards and research requirements. The department also works towards building the social and moral character of the students.

	Student Intake	Degrees Awarded
MSc (2-year)	47	37
M.Tech.	38	9
PhD	-	6

R&D Activities: The department has received 4 new projects with a sanctioned outlay of Rs.9,53,8000/. Total Income generated from sponsored and consultancy projects Rs.5,37,7489/-.

	Sponsored Projects	Consultancy Projects
New Projects	4	-
Ongoing	19	5
Completed	7	-

Department of Electrical Engineering

Since its inception in 1958, the Department of Electrical Engineering at IIT Bombay has been active in teaching and research. Currently, the department has 61 faculty members and 1300 students.

Academic Programme: Initially the department began with three programs to award degrees, namely, Bachelor of Technology, Master of Technology, and Doctor of Philosophy. Since 1996, the department is offering a five year dual degree (Bachelor of Technology and Master of Technology) in the two specializations – Communications and Signal Processing, and Microelectronics. Since 2009 the department is offering admissions to a new, dual degree (MTech + PhD) program. This program is designed to induct bright students who have completed their B.E./BTech./M.Sc. degrees directly to the doctoral program. Total student strength at present is 1300 (including UG and PG).

	Student Intake	Degrees Awarded
B.Tech	60	64
DD(BTech + M.Tech)	64	63
M.Tech	137	128
M.Tech + PhD	2	-
PhD	77	2

R&D Activities: The research areas of the department include Communications and Signal Processing, Control and Computing, Power Electronics and Power Systems, Microelectronics and VLSI design, and Electronic Systems. In addition it has a strong Department Academic Mentorship Programs (D-AMP), under the aegis of the Institute Student Mentor Program (ISMP). D-AMP is responsible for helping out Electrical Engineering students who face academic problems. Recently EE Students started new activity namely "Students Reading Group at Electrical Engineering" to improve R&D environment in the department and improvement in communication and presentation skills of the students.

	Sponsored Projects	Consultancy Projects
New Projects	49	26
Ongoing	141	26
Completed	29	25

The department is equipped with the state-of-the-art experimental and computational facilities for undertaking research in various fields. There is a strong collaboration with industry and a number of laboratories are established through such collaboration. Research collaborators also include researchers from several national and international universities, and research organizations.

Energy Science and Engineering

Energy Systems Engineering was founded in 1981 as an interdisciplinary group at IIT Bombay, offering M.Tech and PhD programmes. In 2007, the Board of Governors of IITB approved the growth of Energy Systems Engineering into a Department of Energy Science and Engineering. The department aims to provide manpower and research inputs that are critical for the growth of India's energy sector, and also aims to provide innovative energy technologies and systems to mitigate the global problem of climate change. Currently the department has 21 core faculty and about 30 associate faculty members from other departments and 450 students.

Academic Programmes: The department of Energy Science & Engineering (DESE) offers Dual-Degree B.Tech-M.Tech programme (intake through JEE), Dual-Degree M.Sc-PhD programme (intake through JAM), M.Tech programme in Energy Systems Engineering, PhD programme, and Minor programme in Energy Engineering

	Student Intake	Degrees Awarded
DD(B.Tech + M.Tech)	30	44
M.Tech	25	26
PhD	12	12
DD(MSc.+ PhD)	20	9

R&D Activities: The Department's research areas included renewables (Solar PV, Solar thermal and biomass), batteries and storage, power systems and power electronics, energy integration and energy efficiencies and nuclear energy.

The department had organized the 5th International Conference on Advances in Energy Research (ICAER 2015) during December 15-17, 2015. The conference was aimed to provide a common platform for the researchers in the field of Energy and allied domains in line with the vision of the department 'To develop sustainable energy systems, solutions and workforce for the future'. The department had celebrated the 15th edition of Energy Day on March 12, 2016. Energy Day is the flagship event of the department which aims at the integration of industry and academia and helps in fostering a strong relationship between them. Research work on 'Thermal Resources and Utilization', 'Renewable energy and advanced materials', and 'Energy systems - planning and optimization' were showcased in the exhibition during the Energy Day celebrations.

Department of Mathematics

From its inception to the present, the Department of Mathematics has evolved and grown in several directions. The department has 50 faculty members including two emeritus fellows. The department is involved in the formation of a National Centre for Mathematics (NCM) and National Programme on Differential Equation (NPDE). NCM is a collaborative venture of IIT Bombay with the Tata Institute of Fundamental Research designed to promote research and instructional activity for doctoral students and researchers throughout the country.

Academic Programme: The Department offers two Master's Programme, one in Mathematics and the other in Applied Statistics and Informatics (ASI), and also a PhD programme. There are also minor programmes for undergraduates offered in both Mathematics and Statistics, in addition to the core undergraduate curriculum.

	Student Intake	Degrees Awarded
M.Sc (MA)	29	27
M.Sc (ASI)	33	29
PhD	9	6

R&D Activities: The research pursued in the department includes a wide spectrum of interest in both Mathematics and Statistics. The department features a vibrant atmosphere for research, which is further bolstered by collaborative interactions with Mathematics and Statistics department in leading universities and research organisations across the world.

	Sponsored Projects	Consultancy Projects
New Projects	1	-
Ongoing	41	-
Completed	-	-

Department of Mechanical Engineering

The Department of Mechanical Engineering is by far the largest department at IIT Bombay. It has a total of about 50 faculty members involved in teaching and research and and more than 200 enrolled PhD students.

Academic Programme: The department offers, besides the flagship B.Tech program in Mechanical Engineering, M.Tech and PhD programs. The M.Tech programs offer specializations in Thermal & Fluids Engineering, Design Engineering, and Manufacturing Engineering. The department has introduced new elective courses; these include Moving Boundary Problems in Solidification and Energetic Materials. A new Measurements Laboratory has been set up for the undergraduate students.

	Student Intake	Degrees Awarded
B.Tech	116	90
DD(B.Tech + M.Tech)	22	54
M.Tech	123	73
PhD	48	8

R&D Activities: Over the last decade, the department has focused on science based research and development, to evolve technological innovation in the areas of Thermal, Fluid, Design and Manufacturing Engineering. The department has established state-of-the-art research facilities after procuring massive external funding from the government agencies and private industries. The department also offers an industry-sponsored M.Tech program in Materials, Manufacturing and Modeling (MMM), in collaboration with the Department of Metallurgical Engineering and Materials Science, and the Department of Mathematics at IIT Bombay.

The department has four multi-disciplinary research centers viz. National Center for Aerospace Innovation and Research (NCAIR), Biomedical Engineering and Technology Incubation Centre (BETIC), Thermal Hydraulics Test Facility and Suman Mashruwala Advanced Microengineering Laboratory.

Department of Metallurgical Engineering & Materials Science

The department continues its quest for excellence in research and teaching in areas of metallurgical engineering and materials science. The research output has increased significantly, both in quantity and quality. This has been possible due to substantial funding received from government and non-government agencies. The Centre for Excellence in Steel Technology, funded by the Ministry of Steel, has initiated a number of projects in different thrust areas. Many researchers are visiting the department and faculty is involved in extensive collaborative research. Several faculty members have been conferred with awards and recognitions for their work. Department has recruited several young faculty members and continues to look for bright researchers to join the department.

Academic Programme: An academic review of the M. Tech programme was conducted and the modified curriculum suggested, was accepted by the senate for implementation from the academic year 2015-16.

	Student Intake	Degrees Awarded
B.Tech	99	59
DD(B.Tech + M.Tech)	27	54
M.Tech	75	63
PhD	30	20

R&D Activities: The department undertook 17 new sponsored projects with sanctioned outlay of Rs.6,25,19,895/-. The total number of faculty involved was 34.

	Sponsored Projects	Consultancy Projects
New Projects	17	-
Ongoing	45	-
Completed	18	-

The department has installed, tested and commissioned following equipments at an outlay of Rs.11.05 crores for CoEST program:

- Dialatometer, Watergess Gmbh make
- Thermomechanical simulator, Gleeble make
- Digital Image Co-relation System, GOM Gmbh make
- Surface Profilometer

Department of Physics

The Department of Physics started in June 1958, as one of the science departments in the Institute at that time. It has a tradition of vibrant teaching and offers many research programmes.

Academic Programmes: The department offers B.Tech. in Engineering Physics, Master of Science degree in Physics as well as a PhD 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. degree in Engineering Physics with specialization in nanotechnology and nanomaterials. The department along with Material Science and Metallurgy has started a dual degree programme of M.Sc. in Physics and M.Tech. in Material Science.

	Student Intake	Degrees Awarded
B.Tech.	34	28
DD(B.Tech. + M.Tech.)	10	11
M.Sc.	33	31
DD (MSc + PhD)	8	4
PhD	22	8
(MSc + M.Tech) [PMS (Phy. Mat. Sci.)]	8	-

R&D Activities: At present the department houses cryogenic facilities like a helium liquefier catering to more than 15 low temperature equipment across the institute, a workshop supporting in house small scale instrumentation, ultrafast optical spectroscopy setup, NMR, high resolution XRD, a clean room for thin film and semiconductor device fabrication and several material growth facilities like CVD, PLD, etc. Many of these facilities are utilized by researchers across several departments.

	Sponsored Projects	Consultancy Projects
New Projects	8	-
Ongoing	26	-
Completed	25	-

Department of Humanities and Social Sciences

Founded in 1958, the Department of Humanities and Social Sciences (HSS) has six disciplines, namely, Economics, English literature and Language, Linguistics, Philosophy, Psychology, Sanskrit and Sociology. Its faculty offers a wide spectrum of courses at the B.Tech, M.Tech, M.Phil. and PhD levels. The setting up of a Cell for Indian Science and Technology in Sanskrit (CISTS) in the department has not only created new opportunities for research collaboration within and across the institute, but also provided avenues for new research areas for PhD students seeking admission into the department. The department hosted the first Distinguished Professor in Gandhian Philosophy Prof. Douglas Allen from the University of Maine during the year 2015-16.

Academic Programme: Since 1973, the department has been offering a doctoral programme in all its disciplines with emphasis on inter-disciplinary topics. In1993, the department launched a four-semester interdisciplinary M.Phil. programme in 'Planning and Development'. Facilities of the department include a Library, Computer Laboratory, a Psychology Laboratory and Language Laboratory.

	Student Intake	Degrees Awarded
M.Phil	24	15
PhD	18	10
M.Phil + PhD	-	1

R&D Activities: The department faculty are involved in a number of research projects independently, in collaboration with faculty members from other departments of IITB, and as part of international research networks and partnerships. Faculty members and student researchers of the department carry out research in several cutting edge areas and emerging sub-disciplines as well as trans-disciplinary themes such as computational linguistics, climate studies, organizational justice, digital media, innovation, gender and environmental change.

	Sponsored Projects	Consultancy Projects
New Projects	1	-
Ongoing	14	1
Completed	3	-

During the year 2015-16, the department has organised following National and International Conferences :

- International Conference on Science and Jain Philosophy in association with Bhagawan Mahavira International Research Centre in January 2016.
- Biennial International Conference of the Commission on Legal Pluralism in December 2015.

Industrial Design Centre

Industrial Design Centre (IDC) at IIT Bombay offers an excellent environment for academics, research and applications in the field of design. 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 potential for innovation at IDC lies fundamentally in terms of solving real world problems.

	Student Intake	Degrees Awarded
B.Des	30	-
M.Des	65	51
PhD	-	2

Academic Programmes: IDC has a well-established Master of Design degree (M. Des.) programme in Industrial Design, Visual Communication, Animation Design, Interaction Design, Mobility and Vehicle Design & Minor courses as well as a PhD programme in Design. The department in 2015 onwards started a four year, eight semester Bachelor of Design (B.Des.) programme for which the admission is carried through the undergraduate Common Entrance Examination for Design (UCEED) and a five year, ten semester dual degree B.Des. + M.Des. Programme. The Bachelor of Design (B. Des.) programme is a four year, eight semester course and, B.Des. + M.Des. is a five years ten year course, which is available only at the end of the 3rd year. Both these programmes are credit-based and thus offer the flexibility to progress at one's own pace.

R&D Activities: Design and Degree Show 2015 was organised by the graduating batch on June 13-17, 2015. The show was inaugurated by Ms. Amita Sharma (Advisor, MHRD). A 3-day refresher course 'Expo Pdi' on the essentials of Innovative Product Design and Development was held during August 20-22, 2015. It was aimed to provide information to the participants about the overall aspects of Industrial Design including Need Finding, Design Methodology, Innovation and Problem Solving, Product Graphics, Interaction Design, Product Ergonomics, Product Aesthetics etc. The department has also organised Expo info Design, and Typography 2016 during October 8-10, 2015 and February 25-27, 2016 respectively. This year Typography Day was held at Srishti Insitute of Art, Design and Technology, Bangalore in collaboration with IDC.

	Sponsored Projects	Consultancy Projects
New Projects	11	3
Ongoing	42	1
Completed	16	11

The department organised 'CII-IDC, IITB-DSIR Conclave for MSMEs on New Product Development' during September 11-12, 2015. The conclave was aimed to disseminate actionable knowledge that people can use and apply immediately in their workplace for conceiving new products and improving existing products. The department has organised two conferences viz. Cumulus Conference and Humanizing Work and Work Environment (HWWE) 2015 in December 2015. HWWE was jointly hosted by IIT Bombay and the National Institute of Industrial Engineering (NITIE); in collaboration with the Punjab Engineering College, University of Technology Chandigarh, under the theme of "Caring for People".

Shailesh J. Mehta School of Management

Today, Shailesh J Mehta School of Management has occupied its distinct place in the globe as an institute of excellence in management education and research. The school currently has 23 full-time faculty members in all core fields of management.

The year 2015-16 was marked by further strengthening and consolidation of the academic programmes of the School. The school started a joint Executive Masters in Business Administration (E-MBA) programme with Washington University, first of its kind, for professionals with a minimum of seven years work experience. The programme is spread over duration of 18 months, where classes are held on four days in a month in Mumbai and it ends with a two-week capstone experience at Washington University at St. Louis.

Academic Programmes: The school of management offers Doctoral program (PhD) in Management, full-time Master of Management, Executive MBA (E-MBA): Jointly by the Shailesh J. Mehta School of Management IIT Bombay, India and Olin Business School Washington University in St. Louis USA, Certificate Programmes for Executive Education: Short and long duration in-house and open Management Development Programmes for the Corporate executives/professionals of all fields and B.Tech. (minor courses in all areas of management)

	Student Intake	Degrees Awarded
M.Mgt.	116	79
PhD	14	9
E-MBA	27	-

R&D Activities: Faculty members of the school are engaged in many research/consultancy projects in all fields of management. Management Development Programmes (MDPs) exclusively for the corporate houses as well as open for all professionals are also conducted at the School.

	Sponsored Projects	Consultancy Projects
New Projects	3	3
Ongoing	3	1
Completed	-	2

Shailesh J. Mehta School of Management for the first time organized a two-day consortium (sponsored by Deloitte) of PhD Scholars from November 30 – December 1, 2015 on Management in the 21st Century'.

Centre for Environmental Science & Engineering

The Centre for Environmental Science and Engineering (CESE) was established in 1985. The Centre has a core group of 11 faculty members (10 regular and 1 emeritus) with multi-disciplinary background and diversifying research interests. Apart from this, professionals from consultancies and government organizations come for delivering lectures time to time.

Academic Programme: The centre has started a dual degree M.Sc. – Ph.D. programme since July 2010 in addition to already existing M.Tech. and PhD programmes. In addition to these three programmes, the centre is running a minor in Environmental Science and Engineering for undergraduates studying in other departments at IIT Bombay. In near future, a dual degree B. Tech.- M. Tech. programme will also be started. In addition to the above programmes, CESE offers an Institute core course "Environmental Studies: Science and Engineering" to undergraduates and M. Sc. – PhD students. Besides, 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 life styles.

	Student Intake	Degrees Awarded
M.Tech.	19	15
DD (MSc. + PhD)	4	5

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. In addition, the Centre has already established strong links and collaborations with leading industries, academic institutions and national/international agencies by conducting sponsored research and offering consultancy and technical services. The research activities of CESE are supported by excellent experimental and computational facilities, competent and dedicated technical staff and high quality students. The centre is also actively engaged in organizing workshops and CEP courses for benefiting the professional from other academic institutions, industries and governmental sectors.

	Sponsored Projects	Consultancy Projects
New Projects	4	-
Ongoing	14	14
Completed	2	-

Centre of Studies in Resources Engineering

The Centre of Studies in Resources Engineering is a teaching academic unit of IIT Bombay. Thrust areas at the centre are natural resources like water, minerals, vegetation, ocean and atmosphere, environmental and disaster management, coastal and marine environment, agriculture and agro-informatics, tools and techniques such as image processing, geographic information systems, global positioning systems, machine learning, multispectral, hyperspectral and microwave remote sensing, decision support systems, and so on. The Centre's work was presented in some of the prestigious conferences, such as IEEE's IGARSS Symposium in Milan in July 2015, and Indian Society of Remote sensing Annual Symposium in Jaipur in December 2015.

Academic Programme: In addition to Undergraduate Minor in Geoinformatics for B.Tech. and dual-degree undergraduate students of the Institute, the centre offers M.Tech. and PhD program. It has about 110 students in Master and doctoral programs.

	Student Intake	Degrees Awarded
M.Tech.	22	19
PhD	6	12

R&D Activities: The Centre added High Performance Computing laboratory to its infrastructure during the year and several students are considering using it to scale up their work to bigger data sets and models of increased complexity.

	Sponsored Projects	Consultancy Projects
New Projects	9	4
Ongoing	-	-
Completed	2	4

Centre for Technology Alternatives for Rural Areas

The Centre for Technology Alternatives for Rural Areas (CTARA) was set up in 1985 to cater to the technology needs of rural areas.

Academic Programme: The centre offers M.Tech. program in Technology and Development and a PhD program. It also offers Technology and Development Supervised Learning (TDSL) courses to B.Tech. students across the Institute. The course work provides an over view of development issues, resource analysis, rural needs assessment, technological interventions and impacts, and has a strong field component. Teaching and research is aimed at providing relevant solutions to the rural areas. In order to do this effectively, CTARA has developed linkages with NGOs, government departments and ministries, and industry.

	Student Intake	Degrees Awarded
M.Tech.	-	16
PhD	-	1

R&D Activities: The major research area at the centre are the sectors of Agriculture and Food, Appropriate Technology, Drinking water, Energy, Environment, Health, Planning and Policy and Governance.

Centre for Formal Design and Verification of Software

Over the past 17 years, CFDVS has established itself as a national R & D Centre in the area of formal verification of high-integrity software and hardware. The Centre has contributed to several R&D programs in formal verification, and has taken up sponsored industrial projects from various Government organizations like VSSC, ADA, DRDL and DRDO, and also from high-profile private organizations like Intel, Microsoft Research, Texas Instruments, General Motors, etc. Tools and techniques developed at CFDVS have been applied successfully to small and medium sized problems, both from the academia and industry. The Centre is now focussing on automated techniques for larger real-life systems, and to make the resulting technologies available to the end-user community in India.

R&D Activities: The Centre carries R&D activities in the area of quality software development, with a special focus on formal verification techniques for safety-critical applications. The activities can be broadly classified in the category of Logic, Symbolic Simulation, Model checking and Theorem Proving, Trusted Translation Systems, Static Assertion Checking Tools, and Tools and Techniques for GALS Systems and SoCs. The centre in collaboration with ACTREC and BRNS is working on a project titled 'Cell Fate decisions in Hepatocellular Carcinoma Cells regulated by Proteasomal assembly Chaperones-An Integrated network and experimental approach'. Project summary: PSMD9 and PSMD10 are well known proteasomal assembly chaperones. PSMD10, also known as gankyrin is also an oncoprotein. PSMD9 is a novel activator of NF-kB while PSMD10 a potent inhibitor. Intriguingly hnRNPA1, an RNA chaperone forms a common edge between these two non-interacting chaperones. PSMD9-hnRNPA1 intermediate is in the direct path of proteasomal degradation of IkBα. Role of PSMD10-hnRNPA1 interaction in NF-kB activation/inactivation is unknown. NF-kB is held inactive in hepatocellular carcinoma cells where gankyrin is active. Stimuli induced NF-kB activation in these cells results in apoptosis. This project aims to capitalize on these findings and employs an integrated, iterative computational and experimental approach to test the role of above interaction intermediates in cell fate decisions. A major hope is that TNF-a induced activation of a dormant NF-kB in hepatocellular carcinoma cells may rewire a cell death program (even in the presence of PSMD10) achieved either via PSMD9-hnRNPA1 interaction or by novel mechanisms predicted by network analysis.

Centre for Urban Science and Engineering

The Centre for Urban Science & Engineering (C-USE) at IIT Bombay is an interdisciplinary centre for research, teaching and skilled manpower development with the primary mandate of improving urban quality of life. The Centre aims to combine science and technology with sustainable, equitable and human-friendly design to deliver innovative and holistic services to improve the life of the rapidly urbanizing population in the developing world.

Academic Programme:

	Student Intake
PhD	6

R&D Activities: The research activities of the Centre focus on new products and solutions related to housing, transport, water management, energy efficiency, urban informatics, health, governance, urban poverty and citizen science while mitigating the effects of natural disasters and climate change.

Make in India Hackathon: C-USE helped organize and celebrate Make in India week which

showcased the potential of design, innovation and sustainability across India's key focus sectors through a series of highly visible outreach initiatives in Mumbai. The event brought together coders, engineers and designers so as to focus on innovating and solving problem that matter, with select ideas being evaluated by venture capitalists and government representatives. The areas focused during Hackathon were: Water, Transportation and Energy.

C-USE/ UIUC Joint Workshop: C-USE with UIUC jointly organised a workshop at IIT Bombay during March 23-27, 2015. The workshop was part of a collaborative research project which aims to generate new theories of urban spatial structure for Indian cities. The participants were provided with background to: a) Identify different land use and neighbourhood types; b) Explore how the demand for infrastructure, especially, transport, water and waste, varies with land use types; and c) Model how future changes in infrastructure and land use may affect each others. The participants then refined these ideas by reviewing the underlying theories and assumptions, piloting data collections techniques, and using the knowledge they develop to formulate conceptual models and algorithms that advance planning and decision.

Summer School – Behavioural modelling in transportation networks at the university of Tokyo: Students from C-USE participated in the summer school course at the University of Tokyo on 'Behavorial Modelling in Transportation Networks' under the mentorship of Prof. Arnab Jan in September 2015 and has won the Davis Award for achieving excellent grades at the summer school.

Centre for Research in Nanotechnology and Science

IIT Bombay is one of the leading institutions in the country for research in the area of Nanotechnology. IIT Bombay has recently consolidated its Nanotechnology research activities through the formation of a Centre for Research in Nanotechnology & Science (CRNTS). The formation of this centre has been made possible through a generous grant from the Department of Science & Technology (DST), Government of India.

The centre hosts Sophisticated Analytical Instrument Facility (SAIF) which houses a variety of major analytical instruments which are operated and maintained by a dedicated and qualified group of Scientists and Engineers. It is an integral part of IIT Bombay and operated with an 'open access policy'. During the year SAIF had organised 'Electron Microscopy course' during March 28-31, 2016. Lectures delivered during the course were on 'Principle of microscopy', 'Sample preparation', 'Instrumentation', 'Beam-Specimen Interactions (SEM)', 'Image Interpretation (SEM,TEM)', and 'Analytical Microscopy (EDS, WDS).

Academic Programme: The centre offers PhD programme in Nanotechnology.

	Student Intake	Degrees Awarded
PhD	-	17

R&D Activities: The centre is one of the leading centres in the country for research in the area of Nanotechnology. At IIT Bombay, over 45 faculty members from 9 different departments/ schools are working together in the broad areas of Nanotechnology, with support from various government agencies and private industries. This research has resulted in over 400 high quality publications in the last 7 years in international journals and conference proceedings and a large number of patents. Some of the research activities at IIT Bombay in the Nanotechnology area are at par with some of the best institutions in the world. IIT Bombay has also been selected as one of the two institutions in the country for setting up a 'Centre of Excellence in Nanoelectronics' by the Ministry of Communications & Information Technology (MCIT), Government of India.

Education Technology

The Inter-Disciplinary Programme in Education Technology started in the Institute in 2010-11. In addition to Institute courses at a PhD level, the group organizes short-term intensive courses on effective teaching-learning and educational research methodologies through QI and CEP and the Teach 10000 Teachers project. Faculty members and research scholars of the group play a significant role in the organization of IEEE conference on Technology for Education (TFE), carry out sponsored projects for the National Mission on Education through ICT (NMEICT) and provide consultancy to educational technology industries.

Academic Programme: The group offers PhD programme in Educational Technology. The PhD students include engineering college teachers from colleges in and around Mumbai. The group continues to offer core courses and elective in educational technology content and methods. These Courses have had enrollment from B.Tech and PhD students in other academic programmes within the Institute.

	Student Intake
PhD	23

R&D Activities: The main areas of focus of the R&D activities of the group are: Technology-enhanced learning environments for thinking skills, which are pan-domain cognitive skills such as, engineering design, problem-posing, estimation, algorithmic thinking, modeling, data representation & analysis; frameworks for teacher use of educational technology tools strategies and development of AI & ICT based tools for teaching-learning goals such as automated content generation and assessment.

Industrial Engineering and Operations Researchers

Industrial Engineering and Operations Research (IEOR) at IIT Bombay is an interdisciplinary programme that offers PhD and M.Tech. degrees in IEOR and an M.Sc.-PhD Dual Degree in Operations Research. IEOR has seven faculty members and one emeritus fellow. Together with other institute faculty members who are associated with the programme in research and teaching, IEOR has a depth and breadth in capability that makes the programme unique in the country. Prof. Ted Ralphs, Lehigh University, visited the department & delivered lecture series.

Academic Programme: IEOR is participating in the IITB-Monash Academy PhD programme, with one of its research scholars in the joint PhD programme The programme currently has 12 PhD scholars, 40 M.Sc.-PhD Dual Degree students and 34 M.Tech. Students.

	Student Intake	Degrees Awarded
M.Tech.	23	18
DD(MSc + PhD)	9	4
PhD	3	3

R&D Activities: Faculty members served as referees for several journals and international conferences. The department hosted 21 visitors from academia and industry in the year. Faculty members visited various universities to pursue joint research. A new computational cluster was set up in PhD lab for research in computational methods of Operations Research.

	Sponsored Projects	Consultancy Projects
New Projects	7	1
Ongoing	17	2
Completed	3	1

Systems and Control Engineering

The Systems and Control group formed in 1977, is a unique interdisciplinary program in the country that offers post-graduate education (M. Tech./PhD) in the broad area of Systems and Control. The group has 8 core faculty members and about 11 associated faculty members from other academic units of the Institute.

Academic Programme: The group offers post-graduate education (M. Tech./PhD) in the broad area of Systems and Control. The average doctoral strength is around 25 and the M. Tech. intake every year is around 12.

	Student Intake	Degrees Awarded
M.Tech.	15	7
PhD	6	5

R&D Activities: 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, stochastic processes, game theory, stochastic control, optimization, economics, information theory and combinatorial coding theory. In addition, research in the areas of process control, identification, behavioural theory, matrix computation, automotive control are being pursued by the associate faculty members.

The experimental lab at Systems and Control is geared towards introducing students to hardware and software that implement control theories learnt as part of coursework.

Climate Change Studies

The Interdisciplinary programme in Climate Studies was initiated at the Indian Institute of Technology Bombay, in January 2012, as one of the first doctoral programmes in India addressing research related to climate change. Over 24 faculty participants are drawn from nine departments across IIT Bombay, with expertise in climate science, technology assessment and policy.

Academic Programme: The group aims to evolve an interdisciplinary curriculum on Climate Studies for training of doctoral and undergraduate students and continuing education professional. Six PhD students were admitted during the year and one International Student Exchange Visits was recorded.

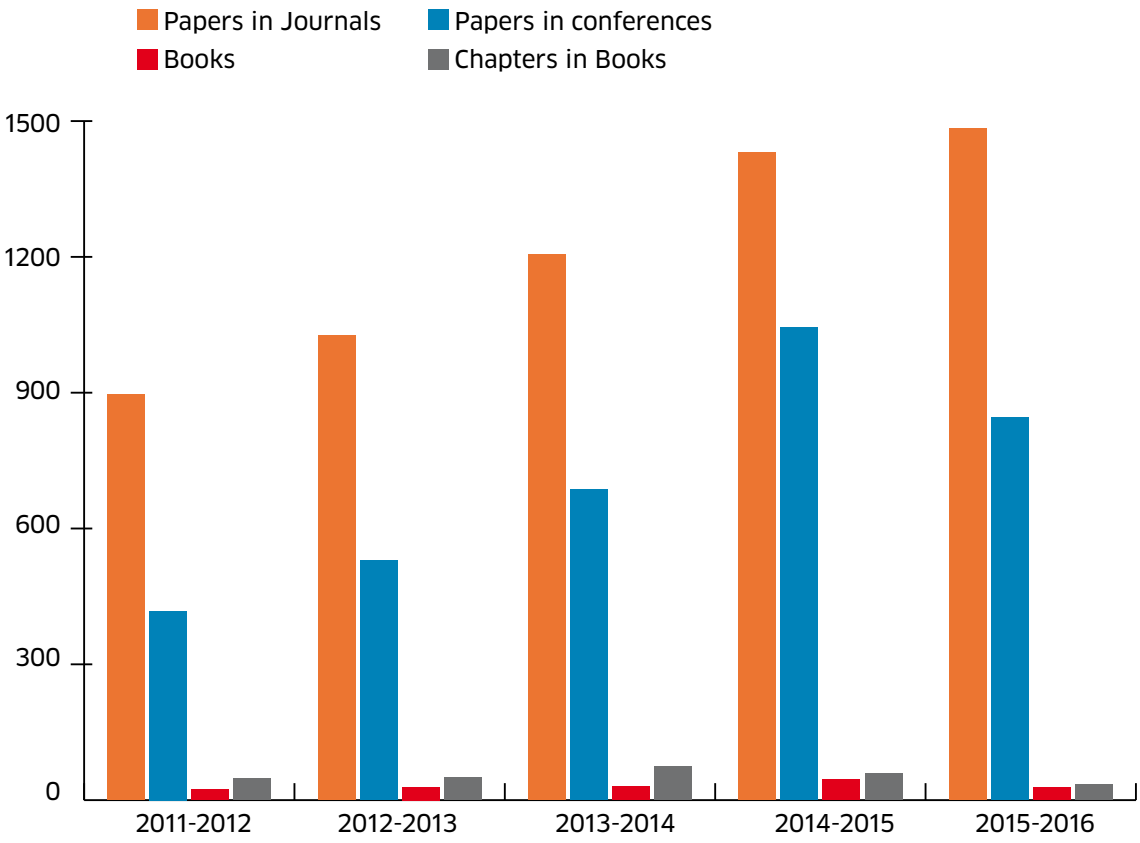
	Student Intake
PhD	5

R&D Activities: The group focuses on the research areas of Prediction of climate extremes, Factors affecting the Indian monsoon, Aerosol radiative processes, effects on clouds and rainfall, LES of cloud processes, Causality analysis and data assimilation, Impacts on hydrology and water resources, and Climate change impacts on ocean processes.

	Student Intake	Degrees Awarded
M.Tech.	1	1
DD(MSc + PhD)	2	-
PhD	-	-

Publications

The number of publications by faculty members of IIT Bombay are steadily increasing. From 896 papers published in national and international journals during the year 2011-12, there is an improvement of 50 % in mere five years, taking the total number of papers published to 1507 in the year 2015-16. Similar trends can be observed for the papers presented in conferences, books and chapters in books authored by the Institute's faculty, in the graph given below:



Year	Papers in Journals	Papers in conferences	Books	Chapters in Books
2011-2012	896	418	23	48
2012-2013	1026	530	29	50
2013-2014	1206	686	30	75
2014-2015	1430	1044	46	59
2015-2016	1507	882	39	52

Detailed list of publications for the year 2015-16 is available at:
http://www.iitb.ac.in/en/about-iit-bombay/annual-reports

Facilities

Infrastructure Development

The infrastructure projects that were completed and functional during the year include 'Hostel 10 Extension' (792 rooms), 'IITB-Monash Research Academy', 'Computer Science & Engineering Department & Computer Centre Building', and 'Type -H1 Staff quarters' (60 flats).

Some projects started earlier year, namely 'Guest House No.3' with 96 rooms and 48 utility apartments, with a 300 seat dining hall and a conference room facility and Retrofitting of Hostel No. 1 & Staff Hostel.

The construction work of common building for the Department of Energy Science and Engineering and Centre for Environmental Science and Engineering is proceeding at a fast pace.

The projects that are in pre-execution stages are Hostel 18 (1000 capacity), Type B-Faculty housing Building 'A' (78 flats) and Facility for Executive MBA programme. All new projects are being designed and built on GRIHA-3 standards. Many other projects such IITB Science Research Park (phase-I) and Centre for Propulsion Technology are at various stages of planning.

Apart from these, building projects that would be constructed in the near future include Hostel 17, Type B-Faculty housing Building 'B' & 'C' (78 flats each), Married Students Apartments (400 units), Rahul Bajaj Technology Innovation Centre, Building for Society for Innovation and Entrepreneurship (S.I.N.E.), and Industrial Research and Consultancy Centre (I.R.C.C.), Steel Centre, development of Workshops, Central Animal Facility and Common building for Estate Office, National Centre for Aerospace Innovation & Research, Tata Centre for Technology & Design, DS Foundation Centre for Entrepreneurship and Bio-medical Engineering Technology Incubation Centre. The Design Consultants for these projects have been appointed after undertaking a 'Concept Design' competition.

Central Library

IIT Bombay's Central Library housed in a huge 3-storeyed building having central air-conditioned, state-of-the-art amenities provide a vibrant ambiance to the students, faculties, staff, alumni, educational institutes and corporate member users for study, research and access to reference materials both on-line and offline. The services of the library is backed by an efficient and courteous staff. It holds a huge collection of books, back volume of Journals, monographs, standards, thesis/ dissertation and subscription of current journals/ magazines etc. in the varied areas of engineering, sciences, technology, humanities and social sciences both in print and electronic format. The institutional repository of IIT Bombay publications also attract large number of users from academia and industries throughout the year.

The library collection was used by 14,971 members during the year. The institutional repository of IITB publication which now has over 18,107 records has also attracted more than 8,00,000 hits during the year.

During this year 769 Masters degree dissertations, 291 PhD theses and 272 Dual Degree were submitted online.

The budget of Central Library, typically for a given year, ranges about 17.5 crores. Central library subscribed more than 1,500 journals (over 90 per cent of its journals in online-only format) and added about 1,468 volumes including books, theses, reports, standards, pamphlets and other reading materials during the year. It also acquired 414 e-books during the year. All the library collection can be accessed through online-public access catalogue.

In addition to the above, the library also renders services like reference and consultation, arranging materials from other libraries through inter-library-loan, providing the book bank facility for IIT Bombay students belonging to economically and socially weaker sections of the society and arranging the user awareness programmes to enhance about awareness about library resources, services and activities. The library allows self

check-out of books as well as online renewal of borrowed books. It also provides internship facilities to Library Science students from other educational sectors. It handled over 84,406 loan transactions of books and other documents for its members during the year. Central library also offers services to industry and corporates, IITB alumni and engineering (educational) institutions, professional members and has earned over Rs.18,39,200 for the services rendered.

The library is open from 0900 to 2300 hrs on all working days and from 1000 to 1700 hrs on holidays (except three national holidays). The library remains open till 0100 hrs on all days during examinations. However, around the clock air-conditioned reading hall facility with 150 seating capacity for the bonafide users of the library is also available.

The library interacts with its members/ users mainly through its homepage (www.library.iitb.ac.in) which is dynamically updated during the year to make it more user friendly. The library is providing wi-fi connectivity. The library extensively uses social media like Blog, Facebook and Twitter for improved communication and interaction to post current and interesting information and news items.

Computer Centre

The Computer Centre continues to provide computational, network infrastructural facilities and services to the IIT Bombay user community.

Network and Connectivity
The Centre manages the campus network and is responsible for the availability of intra-campus connectivity of all the departments, hostels, residential complexes and internet connectivity of Institute with the outside world. The following activities were undertaken during the year:

The intranet of IIT Bombay has been upgraded to the following four levels of network hierarchy:

- Top level is 40 Gbps 5-node fail-safe single-mode-fiber ring.
- Each node in the ring connects to several (15-25) distribution points over 10 Gbps single mode fiber. Distribution points are in the departments, hostels and network kiosks in residential area.
- Academic departments continue manage their own internal network; CC manages the non-academic areas, hostels, residential areas.
- Hostel wings and residential buildings are connected by 1/10 Gbps single mode fiber optics cable and "last mile" access is CAT 6 cable providing upto 1000Mbps Ethernet access.

The total Internet bandwidth for IIT Bombay campus users have been increased from 4250 Mbps to 1250 Mbps with the services from three service providers: 10 Gbps from NKN, 1.25 GbPs from M/s. Tata Teleservices and 1 Gbps from M/s Vodafone. For optimum utilisation of the internet the following has been implemented.

- BGP routing to connect to the three ISPs through simple load balancing using open source software.
- Internet access is by NATting via four Class C address ranges recently acquired from APNIC.
- Web access is through proxy and "direct access" where a legitimate user authenticates the IP address.
- Users at the residences have a separate web access account and employees do not have to share their passwords with family.
- Transport layer security has been purchased via digital certificate from GeoTrust.

About 200 new WiFi access points have been deployed on campus to cover large part of the academic area, guest houses and Central Library.

High Performance Computing Facility: The cluster 'Spacetime Supercomputing' facility consisting of 380 nodes built using the Intel quad core processors has been operational on the ground floor of the old Computer Science and Engineering Department building.

National Knowledge Network: IIT Bombay continued to be a member of the National Knowledge Network (NKN) during the year. This multi-gigabit network initiative started by the National Informatics Centre (NIC) is being

used by CDEEP to conduct distance education programmes. Staff from the Computer Centre also participated in the the national level meet of the NKN.

Grid Computing Facility GARUDA: The grid computing facility GARUDA is also supported by the Computer Centre allowing 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 flavors of Linux Operating Systems on its anonymous FTP server which is available to the user community at large.

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

Software packages meant for scientific and technical computation such as ANSYS, MATHEMATICA, Labview, OriginLab, Cisco's webex for video conferencing facility etc. that are available through appropriate licenses schemes are procured, upgraded and administered by Computer Centre as per the requirements of the students, faculty, scientists and staff. The software ABAQUS was added to the list of commercial packages used for technical computing.

The Computer Centre encourages and has installed Open Source Software Systems for Office Automation in about 800 PCs deployed in the various administrative sections of the Institute, which has eliminated the spread of computer virus on computers to a great extent.

The Computer 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 Computer Centre enables the Electric Maintenance Division to monitor the Power Distribution Systems, check the status of various Lifts, functioning of UPS Systems, etc. in the Institute. The Telephone Exchange also runs few IP telephones (Voice over IP) using the computer network of the Institute. The schedules of the availability of Doctors at the IIT Hospital on the web site of the Hospital and this information is accessible over the IITB LAN.

Projects for the Near Future: Expansion planned for WiFi access: Steps are being taken towards smooth integration of all communications services (phones, cellular, TV and Internet). Process for providing additional 400 wireless access points for the academic for "blanket coverage", 200 specialised APs (access points) for the classrooms, and 300 wireless access points in the common areas of hostels and open areas in cooperation with 4G service providers, have been planned for near future.

The HPC roadmap: Current infrastructure is about eight years old and upgradation of this facility is planned in west wing on the Ground Floor of the Old CSE building.

Space for about 100 racks divided into three parts viz. Central HPC facility of the Institute; Data Centre for the Computer and backup services for the different services in IITB (mail servers of departments, data from ASC, IRCC, Academic Office, etc).; and Bring Your Own Hardware facility: Resources to house high performance computing hardware acquired by different research groups through their funding sources. These will be provided housing, power, cooling and networked access. Email and storage: Following are some of the proposed facilities that would be available in the near future for email and storage.

- An integrated mail and calendar system for the Institute
- Extend IMAP service to all departments
- Increase storage allocation for email and BigHome.
- Lifetime email to alumni and all faculty/ staff.

Centre For Distance Engineering Education Programme

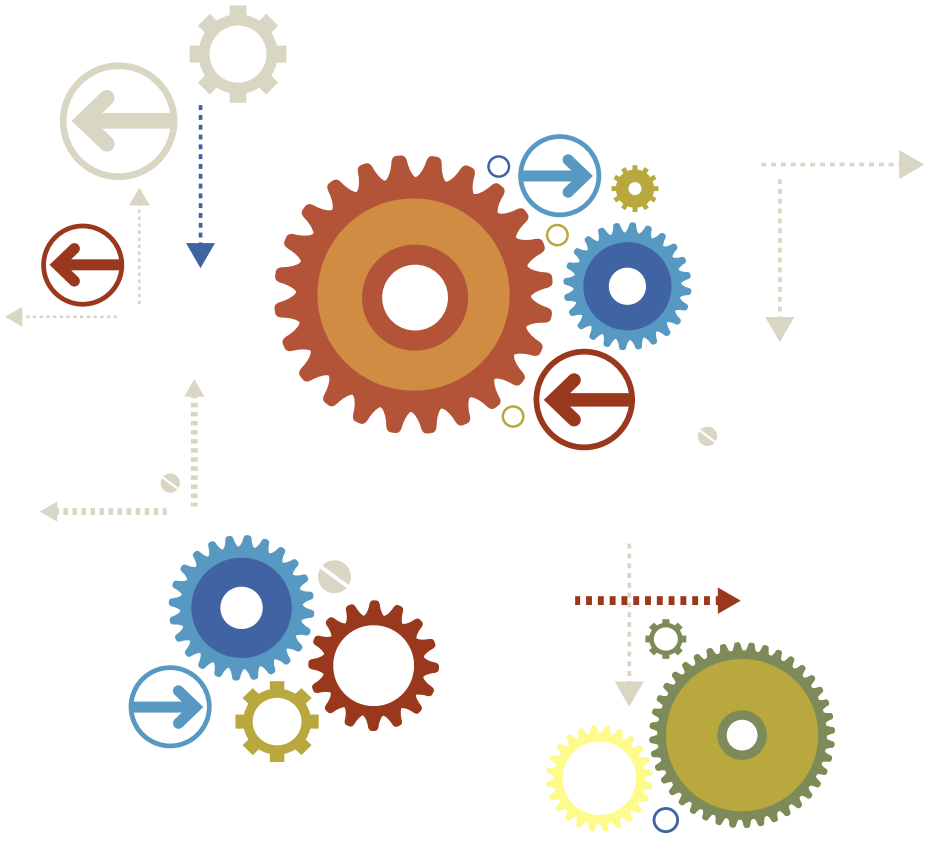
Centre for Distance Engineering Education Programme (CDEEP) has taken a leap in reaching out to more institutions/organisations in India and abroad. During the year, CDEEP recorded and transmitted 16 courses in High Definition with the support of MHRD TEQIP (KITE) project covering 15 disciplines at IIT Bombay. It has now an archive of 322 full

semester long courses.

The courses are now available to the world through cloud. The new feature in the courses edited is that the videos now come with transcription. This facilitates viewing and understanding the lectures even though there could be variation in accent and pronunciation between various course instructors. This year 56 courses were supplied on media to individuals. The viewership of courses through web stood at 7680.

The centre, as its continued parallel activity, covered 48 events, including 53nd Annual Convocation, 57th Foundation day, Institute Colloquia and talks by distinguished speakers on campus.

It has a total of 76 institutions all over India connected, as Remote Centers (RC) of IIT Bombay. The Centre continued its support to various distance education and educational outreach related projects being executed at IIT Bombay.



Infrastructure Facilities On Campus

New Guest House under construction

Inauguration of hostel 10

Inauguration of IITB-Monash Research Academy

Organization

Dr. Anil Kakodkar
Chairman, Board of Governors
(up to 11.05.2015)

Mr. Dilip Shanghvi
Chairman, Board of Governors
(from 04-04-2016)

Prof. D.V. Khakhar
Director

Prof. Subhasis Chaudhuri
Dy. Director (Academic &
Infrastructural Affairs)

Prof. P.M. Mujumdar
(from 30.09.2015)
Prof. H.S. Pandalai (up to 30.09.2015)
Dy. Director (Finance & External Affairs)

Prof. P.V. Balaji (from 20.11.2015)
Prof. P.M. Mujumdar (up to 23.09.2015)
Dean (Research & Development)

Prof. Narayan Rangaraj
Dean (Academic Programme)

Prof. Ravi Sinha
Dean (Alumni & Corporate Relations)

Prof. B.V.S. Viswanadham
(from 31.12.2015)
Prof. N. Venkataramani (up to 31.12.2015)
Dean (Infrastructure Planning & Support)

Prof. Soumyo Mukherji
(from 11.05.2015)
Prof. U.A. Yajnik (up to 10.05.2015)
Dean (Students Affairs)

Prof. R.O. Dusane
Dean (International Relations)

Prof. J. K. Verma
Dean (Faculty Affairs)

Prof. Y.M. Desai
Dean (Administrative Affairs)

Dr. R. Premkumar
Registrar

IIT Council

The Minister In-charge of Technical Education in the Central Government	1.	Ms. Smriti Zubin Irani, Hon'ble Minister of Human Resource Development, Government of India, Shastri Bhavan, New Delhi – 110 001.	Chairman
Chairman of Each Institute (Ex-officio)			
Kharagpur	2.	Dr. Srikumar Banerjee, Chairman, BoG, IIT Kharagpur DAE Homi Bhabha Chair Professor, BARC Central Complex, Bhabha Atomic Research Centre, Trombay, Mumbai.	Member
Bombay	3.	Dr. Anil Kakodkar, Chairman, BoG, IIT Bombay (Homi Bhabha Chair Professor, Department of Atomic Energy, 7th floor, Central Complex, BARC,Trombay, Mumbai – 400 085).	Member
Madras	4.	Dr. Pawan Goenka, Chairman, BoG, IIT Madras. Chennai – 600 036 (Executive Director and President, Mahindra & Mahindra, Mahindra Towers GM Bhosale Marg, Worli, Mumbai).	Member
Kanpur	5.	Prof. M. Anandakrishnan, Chairman, BoG, IIT Kanpur, Kanpur – 208 016.	Member
Delhi	6.	Dr. Vijay P. Bhatkar, Chairman, BoG, IIT Delhi, New Delhi – 110 016.	Member
Guwahati	7.	Dr. R.P. Singh, Chairman, BoG, IIT Guwahati, Guwahati – 781 039.	Member
Roorkee	8.	Prof, Ashok Misra, Chairman, BoG, IIT Roorkee Roorkee – 247 667 (69 Adarash Vista, Basavanagar, Bangalore – 560 037).	Member
Bhubaneswar	9.	Mr. S. K. Roongta, Chairman Board of Governors, Indian Institute of Technology, Bhubaneswar, Bhubaneswar (Odisha).	Member
Gandhinagar	10.	Dr. Baldev Raj, Chairman, Board of Governors, Indian Institute of Technology, Gandhinagar President Research PSG Institution PSG College of Technology Campus, New Administrative Block, Peelamadu, Coimbatore, T.N. 641004.	Member
Hyderabad	11.	Dr. B. V. R. Mohan Reddy Chairman, Board of Governors, Indian Institute of Technology, Hyderabad. (A.P.)	Member
Jodhpur	12.	Prof. Goverdhan Mehta, Chairman, Board of Governors, Indian Institute of Technology, Jodhpur,Jodhpur.(Raj.)	Member

Indore	13.	Mr. Ajay Piramal, Chairman, Board of Governors, Indian Institute of Technology, Indore, Indore (M.P.)	Member
Mandi	14.	Prof. M. Natarajan, Chairman, Board of Governors, Indian Institute of Technology, Mandi, Mandi (H.P.)	Member
Patna	15.	Mr. Ajai Chowdhry, Chairman, Board of Governors, Indian Institute of Technology, Patna (Bihar)	Member
Ropar	16.	Prof. V. S. Ramamurthi, Chairman, Board of Governors, Indian Institute of Technology, Ropar (Punjab)	Member
Varanasi	17.	Dr. Lalji Singh, Chairman, BoG, IIT(BHU), Varanasi and Vice-Chancellor, Banaras Hindu University, Varanasi -221 005 (U.P)	Member
Director of each Institute (Ex-officio)			
Kharagpur	18.	Prof. Partha P. Chakrabarti, Director, IIT Kharagpur, Kharagpur – 721 302.	Member
Bombay	19.	Prof. D.V. Khakhar, Director, IIT Bombay, Mumbai – 400 076.	Member
Madras	20.	Prof. Bhaskar Ramamurthi, Director, IIT Madras, Chennai – 600 036.	Member
Kanpur	21.	Prof. Indranil Manna, Director, IIT Kanpur, Kanpur – 208 016.	Member
Delhi	22.	Prof. R.K. Shevgaonkar, Director, IIT Delhi, Hauz Khas, New Delhi – 110 016.	Member
Guwahati	23.	Prof. Gautam Biswas, Director, IIT Guwahati, Guwahati – 781 039.	Member
Roorkee	24.	Prof. Pradipta Banerji, Director, IIT Roorkee, Roorkee – 247 667.	Member
Bhubaneswar	25.	Prof. Madhusudan Chakraborty, Director, Indian Institute of Technology, Bhubaneshwar, Samantapuri (Rear side of Hotel Swosti Plaza), Jaydev Vihar, Bhubaneswar – 751 013, Odisha.	Member
Gandhinagar	26	Prof. Sudhir K. Jain, Director, Indian Institute of Technology, Gandhinagar, Vishwakarma Govt. Engg. College (VGEC) Campus, Chandkheda, Visat-Gandhinagar Highway, Ahmedabad – 382424.	Member
Hyderabad	27	Prof U.B. Desai, Director,Indian Institute of Technology, Hyderabad, Ordnance Factory Estate, Yeddumailaram – 502205, Andhra Pradesh	Member
Jodhpur	28	Prof. C.V.R Murty Director, Indian Institute of Technology, IIT Rajasthan Camp Office Department of Computer Science & Engine MBM Engine College, Jodhpur – 342 011.	Member

Indore	29	Prof. Pradeep Mathur, Director, Indian Institute of Technology Indore, Institute of Engineering and Technology, DAVV Campus, Khandwa Road, Indore – 452 017.	Member
Mandi	30	Prof. Timothy Gonsalves, Director, Indian Institute of Technology, Mandi, PWD Rest House, 2nd Floor, Near Bus Stand, Mandi – 175 001. (Himachal Pradesh)	Member
Patna	31	Prof. Partha P. Chakraborti (Addl. Charge), Director, Indian Institute of Technology, Patna, Govt. Polytechnic, Pataliputra's Colony, Patna – 800 013.	Member
Ropar	32	Prof. M.K. Surappa, Director, Indian Institute of Technology, Ropar, Nangal Road, Rupnagar, Punjab – 140 001.	Member
Varanasi	33	Prof. Rajeev Sangal, Director, Indian Institute of Technology (BHU), Varanasi – 221005 (UP)	Member
Chairman, University Grants (Ex-officio)	34	Prof. Ved Prakash, Chairman, Commission University Grants Commission, Bahadurshah Zafar Marg, New Delhi – 110 002.	Member
Director-General, Council of Scientific & Industrial Research Ex-officio)	35	Dr. P.S. Ahuja, Director General (DG) of Council of Scientific & Industrial Research (CSIR), Govt. Of India, Anusandhan Bhawan, 2, Rafi Marg, New Delhi – 110 001.	Member
Chairman of the Council Of the Indian Institute of Science, Bangalore (Ex-officio)	36	Dr. K. Kasturirangan, Chairman, Council of IISc. Bangalore, National Institute of Advanced Studies, Indian Institute of Science Campus, Bangalore – 560 012.	Member
Director of the Indian Institute of Science, Bangalore (Ex-officio)	37	Prof. P. Balaram, Director, Indian Institute of Science, Bangalore – 560 012	Member
Three Nominees of the Central Government			
To represent the Ministry concerned with Technical Education	38	Mr. Ashok Thakur, Special Secretary, Ministry of Human Resource Development, Department of Higher Education, Shastri Bhawan, New Delhi.	Member
To represent any other of Finance	39	Mr. R.S. Gujral, Secretary (Expenditure), Ministry of Finance, Department of Expenditure, North Block, New Delhi – 110 001.	Member
To represent any other Ministry	40	Mr. J. Satyanarayana, Secretary, Department of Information Technology, Electronics Niketan, CGO Complex, Lodhi Road, New Delhi – 110003.	Member
Nominees of the Visitor Council for Technical Education (AICTE)	41	Dr. S.S. Mantha, Chairman, All India Council for Technical Education (AICTE), 7th Floor, Chanderlok Building, Janpath, New Delhi – 110 001.	Member

Nominees of the Visitor (minimum three) (maximum five)	42	Prof. Ashok Jhunjhunwala Professor, Department of Elect. Engineering (Te Ne T) Group, Indian Institute of Technology Madras, Chennai – 600 036 (T.N.)	Member
	43	Dr. T. Ramasami, Secretary, Department of Science & Technology, Ministry of Science & Technology, Technology Bhawan, New Mehrauli Road, New Delhi -110016.	Member
	44	Prof. Ashok Mishra, Chairman – India, Intellectual Ventures India Consulting Pvt. Ltd., # 701- Raheja Paramount, 138-Residency road, Bangalore – 5600025.	Member
	45	Prof. S.K. Joshi, 250- National Physical Laboratory, Dr. K S Krishnan Marg, South Patel Nagar, Pusa, New Delhi – 110012	Member
	46	Prof. R.C. Budhani, 250- National Physical Laboratory, Dr. K S Krishnan Marg, South Patel Nagar, Pusa, New Delhi – 110012	Member
Three Members of Parliament (2 from Lok Sabha) (One from Rajya Sabha)	47	Mr. Deepender Singh Hooda, Hon'ble Member of Parliament (Lok Sabha), 9, Pandit Pant Marg, New Delhi – 110 011.	Member
	48	Mr. Janardhana Swamy, Hon'ble Member of Parliament (Lok Sabha), 137, South Avenue, New Delhi – 110 011.	Member
	49	Ms. Vasanthi Stanley, Hon'ble Member of Parliament (Rajya Sabha), C-501, Swaran Jayanthi Sadan, Dr. Bishamber Dass Marg (Near R.M.L), New Delhi-110001.	Member
	50	Ms. Amita Sharma, Additional Secretary (TE), Ministry of Human Resource Development, Department of Higher Education, Shastri Bhawan, New Delhi.	Member
	51	Mr. Yogendra Tripathi, Joint Secretary & Financial Advisor, Ministry of Human Resource Development, Department of Higher Education,New Delhi.	Member

Members of the Board of Governors		
Nominated by Visitor	Dr. Anil Kakodkar, Homi Bhabha Chair Professor, Department of Atomic Energy, 7th floor, Central Complex, BARC, Trombay, Mumbai – 400 085.	Chairman
Ex-officio	Prof. D.V. Khakhar, Director, IIT Bombay, Powai, Mumbai – 400 076.	Member
Council Nominees (Four)	Prof. Anurag Kumar (from 16/06/2015), Dr. S. Sivaram (upto 15/06/2015), (Four) Director, Indian Institute of Science, Bangalore – 560012.	Member

	Prof. Rohini Godbole (from 16/06/2015) Dr. Ajit Ranade (upto 15/6/2015) Centre for High Energy Physics, Indian Institute of Science, Bangalore - 560012	Member
	Prof. Vijayalakshmi Ravindranath (from 16/06/2015), Prof. Shobho Bhattacharya (upto 15/06/2015) Chairperson, Centre for Neuroscience, old TIFR Bldg., Indian Institute of Science, Bangalore – 560 012.	Member
	Mr. K. Ananth Krishnan (from 16/06/2015), Prof. Dinesh Singh (upto 15/06/2015), Vice President & Chief Technology Officer Tata Consultancy Services, Tidal Park, Taramani, Chennai – 600 113.	Member
State Government Nominees (Three)		
MAHARASHTRA	Secretary, Higher & Technical Education, Government of Maharashtra, Mantralaya, Mumbai – 400 032.	Member
DADRA & NAGAR HAVELI	Mr. Bhupinder S. Bhalla, IAS Hon'ble Administrator U.T. of Daman & Diu and Dadra & Nagar Haveli, Silvasa	Member
GOA	Mr. Ramachandra (Dinar) Balkrishna Bhatkar, First Floor, Vaikunth Niwas Near Youth Hostel, Miramar, Panaji, Goa - 403001	Member
Senate Two	Prof. Amiya K. Pani (from 1/01/2016) Professor, Department of Mathematics, IIT Bombay Prof. S. Durani (upto 31/12/2015) Professor, Department of Chemistry, IIT Bombay Mumbai 400 076	Member
	Prof. Abhiram Ranade, (from 1/01/2016) Professor, Department of Computer Science & Engineering, Prof. S. Biswas, (upto 31/12/2015) Professor, Department of Computer Science & Engineering, IIT Bombay, Mumbai - 400 076	Member
Ex-officio	Dr. R. Premkumar, Registrar, IIT Bombay Mumbai – 400 076	Secretary

Members of the Finance Committee

Dr. Anil Kakodkar Chairman, Homi Bhabha Chair Professor, Department of Atomic Energy, 7th floor, Central Complex, BARC, Trombay, Mumbai – 400 085.	Chairman
Prof. D.V. Khakhar Director, IIT Bombay, Powai, Mumbai – 400 076.	Member (Ex-officio)
Mr. Amarjeet Sinha Additional Secretary, Ministry of Human Resource Development, Deptt. of Higher Education, Government of India, Shastri Bhavan, New Delhi – 110 115.	Member
Mr. V. B. Aras Vice President – Internal Audit, L & T Finance Services, L & T Finance Ltd., The Metropolitan, 4th Floor, C-26/C-27, E- Block, Bandra Kurla Complex, Bandra (East), Mumbai – 400 051.	Member
Mr. Yogendra Tripathi, IAS Joint Secretary & Financial Advisor, Ministry of Human Resource Development, Deptt. Of Higher Education, Technical Section-1, Government of India, Shastri Bhavan, New Delhi – 110 115.	Member
Prof. H.S. Pandalai Dy. Director (Finance & External Affairs), IIT Bombay, Powai, Mumbai – 400 076.	Member
Dr. R. Premkumar Registrar, IIT Bombay. Mumbai – 400 076.	Secretary (Ex-officio)

Building and Works Committee

Prof. D.V. Khakhar Director, IIT Bombay, Powai, Mumbai – 400 076.	Chairman
Superintending Engineer Office of the Supdt. Engineer, Mumbai Central Circle-1, CPWD, 5th Floor, Old CGO Building, 101 MK Road, Mumbai – 400 020.	Member
Superintending Engineer Mumbai (P.W.) Circle 25 Murzban Road, Fort, Mumbai – 400 001.	Member
Mr. K. Srinivas Head, Architectural & Civil Engg. Division, BARC, North Site, Trombay, Mumbai – 400 085.	Member
Mr. Vidyadhar K. Phatak Retired Principal Chief, Town and Country Planning Division, Mumbai Metropolitan Region Development Authority 1/304, Kairav, GE Link, Ram Mandir Road, Goregaon (W), Mumbai – 400104.	Member
Prof. B.V.S. Viswanadham (from 1/01/2016) Prof. N. Venkataramani (upto 31/12/2015) Dean (Infrastructure Planning & Development), IIT Bombay, Powai, Mumbai – 400 076.	Member
Dr. R. Premkumar Registrar, IIT Bombay Powai, Mumbai – 400 076	Member-Secretary (Ex-officio)

Heads of Departments

Prof. Ashok Joshi
Aerospace Engineering

Prof. Rohit Manchanda
Biosciences & Bioengineering

Prof. K.V. Venkatesh
Chemical Engineering

Prof. Krishna P. Kaliappan
(from 20/01/2016)
Prof. R. Murugavel (up to 19/01/2016)
Chemistry

Prof. K.V. Krishna Rao
Civil Engineering

Prof. Varsha Apte (from 18/01/2016)
Prof. S. Sudarshan (upto 17/01/2016)
Computer Science & Engineering

Prof. G. Mohan
Earth Sciences

Prof. Abhay Karandikar
Electrical Engineering

Prof. D. Parthasarathy
Humanities & Social Sciences

Prof. Neela Natraj (from 28/12/2015)
Prof. Sudhir R. Ghorpade (upto 27/12/2015)
Mathematics

Prof. S. S. Joshi
Mechanical Engineering

Prof. N. Venkataramani (from 1/01/2016)
Prof. N. Prabhu (utpo 31/12/2015)
Met. Engg. & Mat. Science

Prof. Prabhakar P. Singh
Physics

Prof. Rangan Banerjee
(from 19/06/2015)
Prof. Santanu Bandyopadhyay (upto 18/06/2015) Energy Science and Engineering

Prof. B.K. Chakravarthy
Industrial Design Centre

Heads of Centres

Prof. Indradev Samajdar
Centre for Research in Nanotechnology and Science & SAIF

Prof. (Ms.) P. Venkatachalam
Centre of Studies in Resources Engineering

Prof. Sanjeev Chaudhari
(from 1/07/2015) Prof. Virendra Sethi (up to 30/06/2015) Centre for Environmental Science and Engineering

Prof. G. Sivakumar
Centre for Formal Design and Verification of Software

Prof. P. M. Mujumdar
Centre for Aerospace Systems Design and Engineering

Prof. Milind Sohoni (from 6/05/2015)
Prof. Rangan Banerjee (upto 5/05/2015)
Centre for Technology Alternatives in Rural Areas

Prof. V.M. Gadre
Centre for Distance Engineering Education Programme

Heads of Schools

Prof. S. Bhargava
Shailesh J. Mehta School of Management

Convenors of Interdisciplinary Programmes

Prof. N. Hemchandra
Industrial Engineering & Operations Research

Prof. B. Bandyopadhyay (from 25/05/2015)
Prof. Ravi Banavar (up to 24/05/2015)
Systems & Control Engineering

Prof. V.M. Gadre
Education Technology

Prof. Chandra Venkataraman
Climate Change

Summary Of Accounts

Balance sheet as on 31/03/2016

(Amount in Rupees)

Sources Of Funds	Schedule	Current Year 2015-2016	Previous Year 2014-2015
Corpus/ Capital Fund	1	2,001,032,664	1,080,149,955
Designated/ Earmarked / Endowment Funds	2	4,430,977,025	5,029,099,599
Current Liabilities And Provisions	3	16,439,253,455	14,051,614,782
Total (A)		**22,871,263,144**	**20,160,864,336**
Application Of Funds			
Fixed Assets			
Tangible Assets	4	4,526,051,619	4,041,334,227
Capital Works-In-Progress	4	7,706,544,970	6,431,306,444
Investments From Earmarked / Endowment Funds	5	40,268,320	36,460,130
Current Assets	7	7,460,596,226	6,934,761,106
Loans, Advances And Deposits	8	3,137,802,009	2,717,002,429
Total (B)		**22,871,263,144**	**20,160,864,336**

Income & Expenditure For The Year Ended 31/03/2016

(Amount in Rupees)

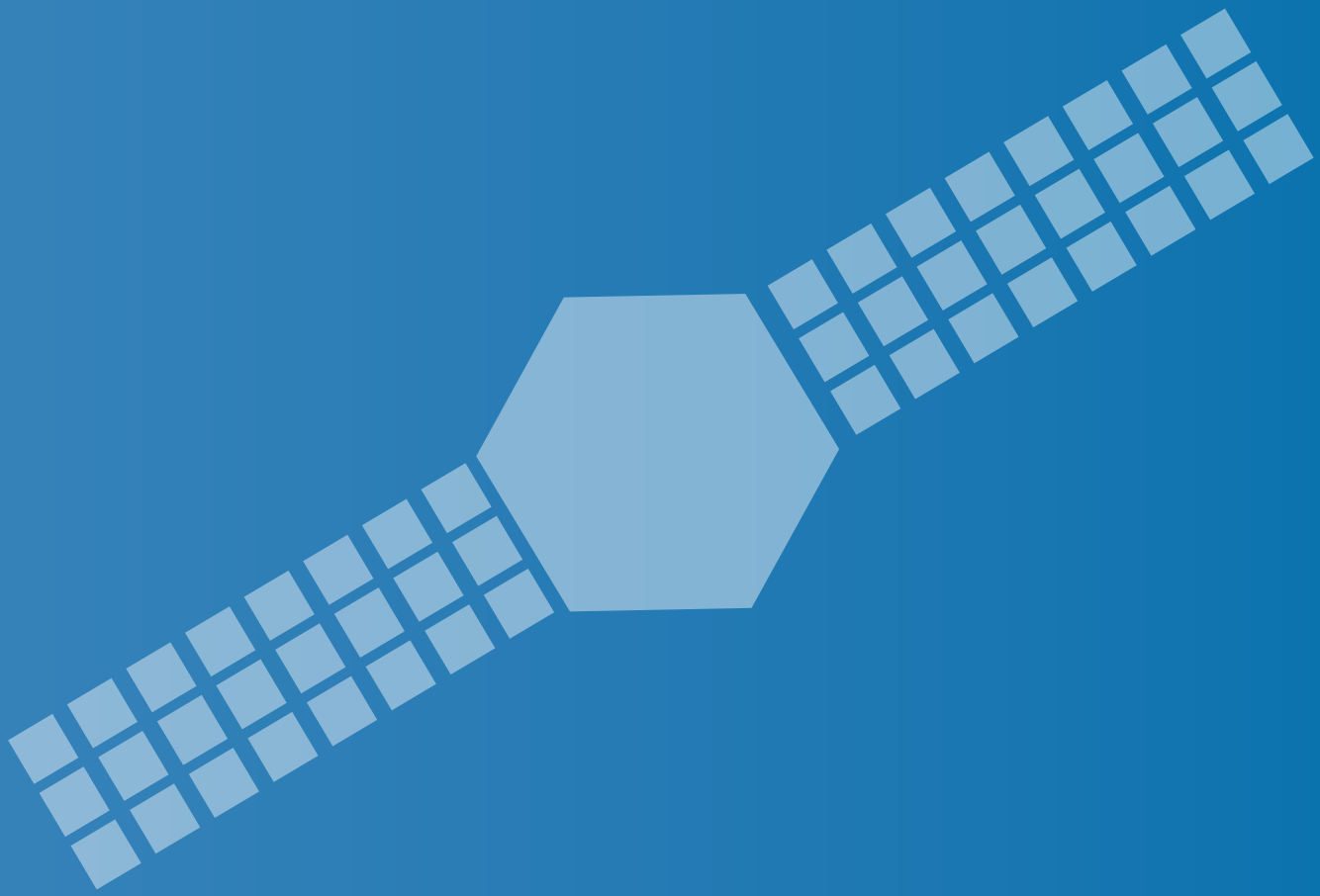
Particulars	Schedule	Current Year 2015-2016	Previous Year 2014-2015
Income			
Academic Receipts	9	717,136,565	681,826,304
Grants / Subsidies (Irrevocable Grants Received)	10	3,870,100,000	2,999,359,775
Income From Investments	11	714,313,987	669,022,102
Interest Earned	12	4,488,402	3,453,275
Other Income	13	395,641,249	366,742,127
Prior Period Income	14	1,696,198	4,420,094
Total (A)		**5,703,376,401**	**4,724,823,677**
Expenditure			
Staff Payments And Benefits (Establishment Expenses)	15	3,883,341,837	3,789,260,789
Academic Expenses	16	880,524,349	555,694,679
Administrative And General Expenses	17	1,019,173,409	970,253,854
Transportation Expenses	18	3,551,999	3,820,914
Repairs & Maintenance	19	612,302,622	568,834,996
Finance Costs	20	769,454	451,627
Write Off	21	3,670,923	3,852,440
Transfer To Ircc Fund		109,240,600	180,421,857
Transfer To Donation Fund		101,664,207	84,379,220
Depreciation	4	362,928,822	440,680,628
Total (B)		6,977,168,221	6,597,651,004
Balance Being Excess Of Income Over Expenditure (A-B)		-1,273,791,820	-1,872,827,327
Adjusted From Capital Fund (Depreciation)		362,928,822	440,680,628
Adjusted From Capital Fund (Write Off)		3,670,923	3,852,440
Transfer To General Reserve		-907,192,075	-1,428,294,259
Actuarial Valuation For Past Period (Leave Encashment, Gratuity & Nps)		0	-8,481,519,468
Balance Being Surplus / (Deficit) Carried To Corpus / Capital Fund		-907,192,075	-9,909,813,727
Significant Accounting Policies	23		
Contingent Liabilities And Notes On Accounts	24		

Note: The value of 907192075/- is arrived after adding deficit of Rs. 138497672/- (Non Plan Rs.1550244/- and Plan Recurring Rs. 136947428/-) and Rs. 768694403/- Acturial Value provision in r/o Leave Encashment, Gratuity and Pension.

Receipts And Payments For The Period From 01/04/2015 To 31/03/2016

Receipts	Amount In Rs	Payments	Amount In Rs
I Opening Balances		**I** Expenses	
a) Cash in hand	585,207	**a)** Establishment Expenses	2,386,366,586
b) Bank Balances		**b)** Academic Expenses	715,790,894
I. In Current Account	457,359,669	**c)** Administrative Expenses	531,504,995
II. In Deposit Account	0	**d)** Transportation Expenses	3,478,365
III. In Saving Account	0	**e)** Repairs and Maintenance	610,853,856
		f) Prior Period Expenses	0
II Grant Received		**II** Payment against Earmarked / Endowment Funds	13,946,915
a) From Government of India	4,713,300,000		
b) Grant in aid due in 2014-15 received in 2015-16	437,000,000		
c) From State Government	0		
d) From other sources	0		
III Academic Receipts		**III** Payment against Sponsored Projects / Schemes	2,406,169,410
a) Fees from Students	358,323,079		
b) Other Receipts from Students	86,899,665		
c) All India Entrance Examination Receipts	293,099,092		
IV Receipts against Earmarked / Endowment Fund	59,381,044	**IV** Payment against Sponsored Fellowships and Scholarship	148,852,744
V Receipts against Sponsored Projects / Schemes	2,109,456,288	**V** Investments and deposits made	
		a) Out of Earmarked / Endowment Fund	0
		b) Out of Own Funds	8,624,607,058
VI Receipts against Sponsored Fellowships and Scholarship	206,956,512	**VI** Term deposits with Schedule Banks	0
VII Income on Investment from		**VII** Expenditure on Fixed Assets and Capital Work in Progress	
a) Earmarked / Endowment Fund	0	**a)** Fixed Assets	1,081,216,192
b) Other Investment	0	**b)** Work-in-progress	1,170,943,922

VIII Interest Received on		**VIII** Other Payment including Statutory Payments	0
a) Bank Deposits	740,860,237	**a)** Other Adjustable Account	877,532,473
b) Loans, Advances etc.	0		
c) Saving Bank accounts	0		
d) Accrued Interest	1,950,409		
IX Investment Encashed	8,373,135,092	**IX** Refund of Grants	0
X Term Deposits with Schedule Bank Encashed	0	**X** Deposits and Advances	
		a) Advances Account	805,257,085
		b) Refundable Deposits	103,579,644
		c) Recoverable Deposits	2,425,420
		d) Deposits Donation Account	150,000
XI Other Income (Including Prior Period Income)		**XI** Other Payment	
a) Continuing Education Programme	4,018,418	**a)** Grant from other organizations	181,440,461
b) Miscellaneous Receipts	380,529,819	**b)** Sundry Creditors	121,325,083
c) Guest House Receipts	5,342,066	**c)** Loan - Inter Department	140,000,000
		d) Other Payment – Project	1,934,003,468
		e) Other Payment – Donation	365,212,638
XII Deposits and Advances		**XII** Closing Balances	
a) Advances Account	252,340,280	**a)** Cash in hand	450,525
b) Refundable Deposits	142,158,966	**b)** Bank Balances	
c) Recoverable Deposits	1,217,380	**I.** In Current Account	606,058,064
c) Deposits Donation Account	79,000	**II.** In Deposit Account	0
XIII Miscellaneous Receipts Including Statutory Receipts	0	**III.** In Saving Account	0
a) Other Adjustable Accounts	2,299,399,331		
b) Donations	383,734,241		
XIV Any Other Receipts			
a) Grants from other Organisations	253,833,204		
b) Sundry Debtors	18,825,690		
c) Loan - Inter Department	776,400,000		
d) Project and Consultancy	451,678,200		
e) Donation Account	23,302,909		



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