

# ANNUAL REPORT 2017-18



**IIT BOMBAY**

**iit  
bombay**  
हीरक जयंती २०१८  
Diamond Jubilee 2018  
एक साथ प्रगति की ओर  
Achieving Excellence Together





# IIT BOMBAY

## ANNUAL REPORT 2017-18







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# Director's Report



By  
*Prof. Devang V. Khakhar*  
*Director, IIT Bombay*

Indian Institute of Technology Bombay has a rich tradition of pursuing excellence and has continually re-invented itself in terms of academic programmes and research infrastructure. 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.

IIT Bombay is celebrating its 60th year of establishment (starting from March 10, 1958 to March 10, 2019) and the Ministry of Human Resource Development granted the status of Institution of Eminence (IoE) to IIT Bombay on July 9, 2018.

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 attracts the brightest students from the country for its Bachelor's, Master's and Doctoral programmes. The Institute provides cutting-edge education and ensures that its students are also of exceptionally high quality. IIT Bombay continues to be the most sought-after destination for undergraduate (UG) and postgraduate (PG) studies and attracts top performers in national examinations such as GATE, CEED, NET, JAM and JEE. Among 23 IITs in the country, 47 out of top 50 rankers and 63 of top 100 rankers in JEE 2018 have joined IIT Bombay. 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. During the year 2017-18, a four-year Bachelor of Science program in Mathematics was started with admission through the JEE

(Advanced) and a five-year Dual Degree (BTech+MTech) programme in Environmental Science and Engineering was started. Another new initiative was the offering of a Minor in Urban Design and Engineering (UED) and a Dual Degree programme in 'Construction Technology and Management (CTaM)' as specialization in the Department of Civil Engineering.

With our theme - Research that makes a difference, IIT Bombay has been making concerted efforts to align its R&D focus with the national goal of achieving technological self-reliance. The R&D revenues for the financial year 2017-18 was Rs. 312 crores. There were 116 patent applications filed during the year. The Institute signed 42 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 also other parts of the globe. The Institute has 643 faculty members on rolls, 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 60 years of its existence, more than 55000 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.

## 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



**Dr. Yusuf Hamied, Chairman, CIPLA Limited receiving the degree of Doctor of Science (Honoris Causa) by the Hon'ble Chief Minister of Goa, Mr. Manohar Parrikar at the 55th Convocation of IIT Bombay**

IIT Bombay continues to make forays into newer territories pertinent to undergraduate and postgraduate education. After elaborate discussions at various levels in the Institute, a four-year Bachelor of Science programme in Mathematics with admission through the JEE (Advanced) and a five-year Dual Degree (BTech+MTech) programme in Environmental Science and Engineering were started. At the postgraduate level, a Master's Programme in Public Policy and an Interdisciplinary Dual Degree programme (BTech [of parent Department]+MTech [of other Department]) were started. Another new initiative is the offering of a Minor in Urban Design and Engineering (UED) in BTech programme and a Dual Degree programme in "Construction Technology and Management (CTaM)" as a specialization in the Department of Civil Engineering. All of these were introduced during Academic Year 2017-18.

At the 55th Convocation, a total of 2612 degrees were awarded: BTech - 857, MSc (5 Yr. Int.) - 29, MSc (2 Year) - 242, MTech - 862, MDes - 63, MPhil.-31, MMgt - 117, PGDIIT

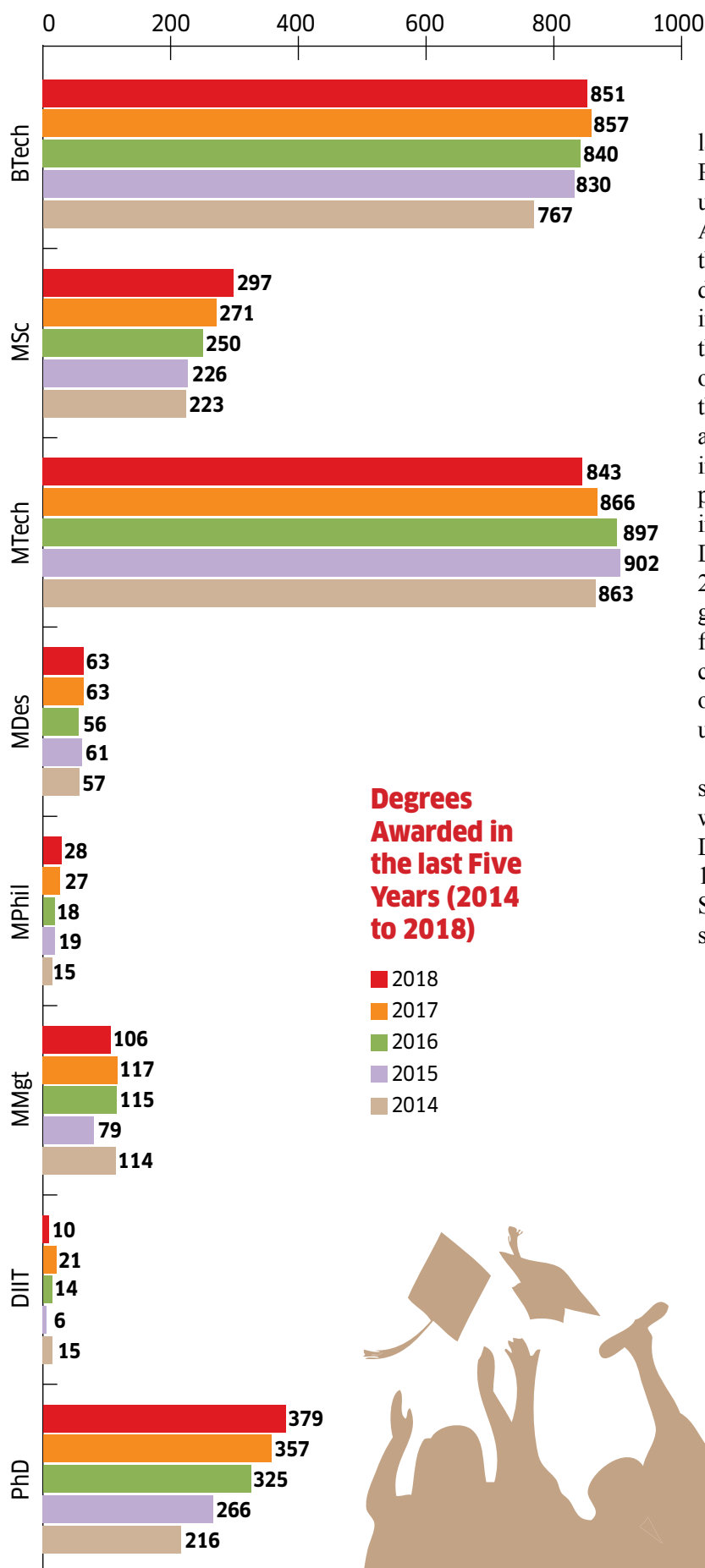
(Exit) – 21, PhD – 357, MS By research – 6, EMBA – 27, Dual Degrees – 294.

With an increase in undergraduate (UG) and postgraduate (PG) intake, the student population has undergone significant changes in the last 10 years. In 2006-07, the number of on-roll UG students was 2460 (46.67%) while the number of PG students was 2810 (53.32%) [Masters – 1598, PhD – 1212]. This changed to 3400 (43.79%) and 4363 (56.17%) for UG and PG students, respectively in 2011-12. Presently, the Institute has about 10169 students of which 4141 (41%) are UG and 6028 (59%) are PG.

In order to continue imparting high-quality, holistic education to the much larger student populace, the Institute continues to modify and evolve processes which can effectively address the changing situation.

The PhD student strength increased in leaps and bounds in the last 15 years. From 771 PhD students in 2001-02, the number increased to 1879 in 2011-12 and currently stands at about 3083.

The number of students graduating with a PhD has also been steadily increasing. In the



last 10 years, the number of PhD degrees awarded went up from about 180 to 357. A significant fraction of these are in the engineering disciplines. All students involved in research at the Institute are given an opportunity to interact with the research community at the national and the international levels by providing funds to attend international conferences. During the academic year 2017-18, 311 students were granted financial assistance for attending international conferences and an amount of Rs. 3,02,61,753 was utilised for this purpose.

This year, four MTech students, one MDes student were selected for the DAAD Scholarships 2017-18 under the Sandwich System for Master's students.



# Research And Development Activities

Research and development activities at IIT Bombay has continued growing rapidly. The R&D receipts for projects during the financial year 2017-18 was approximately Rs. 312 crores.

During the year 2017-18, 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.

## External Grants for R&D

The sponsored research was mainly supported by the government entities. A list of few major government agencies are given in Table 1. A list of some of the Indian Industry and other sponsors is given in Table 2 and a list of few foreign sponsors of sponsored research projects is given in Table 3.

**Table 1:** Few Sponsors from Indian Government Agencies

- Aeronautical Research & Development Board
- Board of Research in Nuclear Sciences
- Defence Research & Development Organisation
- Department of Biotechnology
- Department of Electronics & Information Technology
- Department of Science & Technology
- Indian Council of Medical Research
- Indian Space Research Organisation
- Ministry of Culture
- Ministry of Environment, Forest & Climate Change
- Ministry of Human Resource Development
- Ministry of New and Renewable Energy
- Ministry of Power
- Ministry of Textiles
- Ministry of Urban Development
- University Grants Commission

**Table 2:** Few Sponsors from Indian Industry and Other Organisations

- Azim Premji Philanthropic Initiatives Private Limited
- Ferring Pharmaceuticals Pvt. Ltd.
- GAIL (India) Limited
- Glochem Industries Ltd.
- Idea Cellular Pvt. Ltd.
- Intel Mobile Communications India Pvt. Ltd.
- Jamsetji Tata Trust
- JSW Steel Ltd.
- Microsoft Research Lab India Pvt. Ltd.
- Next Education India Pvt. Ltd.
- NTPC Energy Technology Research Alliance
- Oil & Natural Gas Commission
- Portescap India Pvt. Ltd.
- Powai Lab Technologies Pvt. Ltd.
- Power Grid Corporation of India Limited
- Reliance Industries Ltd.
- Sandvik Materials Technology
- Shimadzu
- Tata Consultancy Services Ltd.
- TE Connectivity India Private Limited
- Wadhvani Foundation
- Zigma Global Environ Solutions Private Limited

**Table 3:** Few Sponsors from Foreign Industry and Other Organisations

- Applied Materials Inc., USA
- China Overseas Development Association, China
- Exxon Mobil Research and Engineering Company, USA
- Grand Challenges Canada, Canada
- Indo-French Centre for the Promotion of Advanced Research, France
- Indo-US Science & Technology Forum, USA
- International Business Machines Corporation, USA



- International initiative for impact evaluation (3ie), USA
- Johns Hopkins Bloomberg Scholl of Public Health, USA
- Marie Curie International Research Staff Exchange Scheme, Europe
- Max Planck Society, Germany
- Mozilla, USA
- Murata Manufacturing Co., Japan
- Qualcomm, USA
- The United Nations Children's Fund, USA
- Toddler Food Partners, USA
- University of Michigan, USA
- Wheels Global Foundation, USA

### Some Major Sponsored Projects Initiated

- **Ultrasonic Domestic Water Meter-Product Design and Field Testing**  
Sanctioned outlay: Rs. 3.99 crores over three years  
Funding agency: Ministry of Human Resource Development and Ministry of Urban Development
- **Development of Gallium-nitride HEMT Based Power Electronic Interfaces Enabled by Device-to-System Characterization and Modeling**  
Sanctioned outlay: Rs. 3.9 crores over three years  
Funding agency: Ministry of Human Resource Development and Department of Science and Technology
- **Performance, Reliability and Degradation Evaluation for a MW Scale Solar PV Plant**  
Sanctioned outlay: Rs. 3.45 crores over two years  
Funding agency: NTPC Energy Technology Research Alliance
- **Technology Development for Silicon Heterojunction Solar Cells with > 20% Efficiency over Large Area (6 inch wafer) by Hot Wire Chemical Vapour Processing**  
Sanctioned outlay: Rs. 2.87 crores over three years  
Funding agency: Department of Science & Technology
- **CityProbe: A City-scale Pervasive Sensing System for Monitoring Road Conditions, Air and Sound Pollution**  
Sanctioned outlay: Rs. 2.39 crores over three years  
Funding agency: Ministry of Human Resource Development and Ministry of Urban Development
- **Multifunctional in Situ Gelling, Self-administered Paint-on Wound Dressing for in Field Trauma Care**  
Sanctioned outlay: Rs. 2.17 crores over three years  
Funding agency: Ministry of Human Resource Development and Defence Research & Development Organisation
- The Ministry of Human Resource Development (MHRD) continued its **Uchhatar Avishkar Yojana (UAY)** scheme and during the year (Phase-II) six projects were approved with an outlay of ~Rs. 27 crores over two to three years. These projects aimed to promote innovation in areas that are directly of relevance to the manufacturing industry. Under this scheme each project is funded by MHRD (50%), participating industry (25%) and the rest (25%) by the participating Department/ Ministry such as the Department of Science and Technology, Department of Space, Indian Council of Medical Research, Ministry of New and Renewable Energy and Ministry of Road Transport and Highways.

- In addition, MHRD has continued to sanction more projects under the scheme called **IMPacting Research INnovation and Technology (IMPRINT)**, focussing research to solve major engineering and technology challenges in the ten domains needed by the country. Thus, it aims to enable, empower and embolden the nation for inclusive growth and self-reliance. Under this scheme, each project is funded by MHRD (50%) and the rest (50%) by participating Department/ Ministry such as the Defence Research & Development Organisation, Department of Science and Technology and Indian Council of Medical Research, Ministry of Earth Sciences, Ministry of Electronics and Information Technology, Ministry of New and Renewable Energy, Ministry of Railways, Ministry of Urban Development. During this year, MHRD funded sixteen projects with an outlay of ~Rs.20.5 crores over two to three years.

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**

- 3D Auto Warning system
- Advanced Combustion Model
- Brand Diagnostic Study of Club HP Brand
- Creation of a Website for Dissemination of State Acts (Govt. of Maharashtra)
- Design and Development of Antenna
- Design of Helmet for Riot Police
- Designing for Development of Integrated Solid Waste Management Systems for Naya Raipur
- Developing an Interface for Integer Optimisation Problems
- Development of Cold Mix Technology
- Development of Flavour Encapsulation Technology Based on Spray Drying and Melt Injection
- Development of Magnetic Drilling Machine
- Economic Costs of Impacts and Adaptation to Climate Change on Water Resources and Human Well-being
- Energy Technologies for River Cruiser Project
- Failure Analysis of HP Fuel Pumps
- Flood Inundation Modelling in Upstream of Hatnur Dam
- Flow Synthesis
- Green Fuel Additives for Engines
- Hazard and Operability Study of Shallow Water Berths
- Improvement of Copper Conductivity and Gypsum Quality
- Linear Response Study in Semiconductors
- Mathematical Modelling with Applications in Inventory Planning and Control Systems
- Mumbai Water Distribution Improvement Programme
- Portable Testing Facility for Cookstoves
- Potency of Coal Tar in Shampoo
- Program Analysis Tools
- Ramming Mass Refractory lining for Induction Furnaces
- Safe Usage of “Thermol-D” for DG Set and Automotive Application
- Study of Bowl Shape in Diesel Engine
- Study on Capacity of Perfumery Plant, Glucose Syrup and Climate Change in India



## Internal Grants for R&D

The Institute provided internal funding for supporting faculty research and student activities. Around Rs. 15 crores were sanctioned for these activities, which included the following:

- Seed grant for initiation of research for new faculty and healthcare consortium
- Augmenting research facilities and maintenance of central and national research facilities
- Augmenting research resources of faculty recipients of Research Publication Award, Impactful Research Award, Research Dissemination Award and Early Research Achiever Award
- Leverage Grants and Bridge Grants
- Research Internships and Fellowships for PhD Students
- Student Research/ Competitions/ Events: Projects such as IIT Bombay Racing, Autonomous Underwater Vehicle, International Aerial Robotics Competition – 2018, Team Shunya, Project Solarise - 2018, Advitiy-Second Student Satellite, Mahindra's Driver-less Car Challenge and TechConnect - 2017

## 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 and students. Some of the awards/fellowships received during 2017-18 are:

### Council of Scientific & Industrial Research awarded:

- Shanti Swarup Bhatnagar Prize for Science and Technology in Chemical Sciences

### Department of Biotechnology awarded:

- Innovative Young Biotechnologist Award
- Tata Innovation Fellowship in Biosciences and Bioengineering
- Women Scientist Fellowship in Biosciences and Bioengineering

### Department of Science & Technology awarded:

- Faculty Innovation in Science Pursuit for Inspired Research (INSPIRE) Grant in Electrical Engineering and Physics
- Ramanujan Fellowship Awards in Computer Science & Engineering and Physics
- Women Scientist Fellowship in Biosciences and Bioengineering

## 2. Licensing Activities

### a) Entrepreneurship:

Rights to technology/ intellectual property created in the Institute were given to researchers for incubation/ entrepreneurship activity in SINE during the year. Some of them are:

- Acuradyne Medical Systems Pvt.Ltd.
- Embryo Bio-Microdevices Pvt. Ltd.
- Gargate Intellectual Property Solutions

- Proximal Soilsens Technologies Pvt. Ltd.
- Startup Company

b) Technology Transfers:

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

- Book titled, 'Cycle Ka Sapna'
- Micronutrient Fortified Cosmetics, Specifically Micronutrient Fortified Oils
- Multi Utility Heat Pump
- Platform Technology for Intra-vesical Delivery in Bladder Cancer
- Process for Water Treatment to Remove Arsenic, Iron and Phosphate by Zero-valent Iron
- Rotating Conducting Disks Based Waste Water Vaporizers
- Software for Bid Matching in Power Exchange (OptiPX)
- Software for Forecasting Load (Web STLF)
- Super Heat Recovery Water Heaters Based on Tube Heat Exchangers
- Technology on Wind Augmentation and Purifying Unit (WAYU)
- Tube-Tube Heat Exchangers
- Web Based Software for Transmission Usage Cost and Loss Allocation (WebNetUse)

### 3) Dissemination/ Outreach Activities:

#### Global R&D summit 2017

IIT Bombay participated in the R&D Exhibition organised by the Federation of Indian Chambers of Commerce and Industry (FICCI) and the Department of Science & Technology, Government of India in conjunction with the 'Global R&D Summit 2017' at Lalit Ashok Bangalore, Bengaluru during April 6-7, 2017. The theme of the summit was "Destination India: R&D and Innovations for Socio-Economic and Industrial Development". The summit involved deliberations on R&D activities in the areas such as - Biotech, Life sciences, Healthcare, Water & Sanitation, Clean Energy, Food Processing, Agriculture, IT/ITES sector, Defence and Aerospace. The Global R&D Summit 2017 witnessed participation of more than 200 delegates, attending eight thematic sessions on various aspects of R&D. The summit also saw the signing of Joint Declaration between the Department of Science and Technology, Government of India and the Ministry of Economic Development of the Russian Federation to stimulate cooperation in the field of promoting innovation activities between the two countries. IIT Bombay and few other government R&D institutions and industry participated in the event. IIT Bombay exhibits included posters on technologies developed in the Institute (both in print and video version). IIT Bombay Videos, R&D Resources Booklet, Technology Brochure, R&D Highlights Fliers. IIT Bombay stall attracted an overwhelming response, mostly from R&D personnel from the government institutions and industry apart from general public.

#### Energy Efficiency Summit 2017

IIT Bombay participated in the R&D Exhibition organised by Confederation of Indian Industry (CII) and CII-Sohrabji Godrej Green Business Centre in conjunction with Energy Efficiency Summit 2017 on August 30-31, 2017 and on September 1, 2017 at Hyderabad International Convention Centre, Hyderabad. The Energy Efficiency Summit 2017 was focused on energy efficient technologies and services. IIT Bombay exhibits included posters on technologies developed in the Institute (both in print and video version), IIT Bombay videos, and R&D Booklets.

## **FICCI Higher Education Summit & Exhibition 2017**

IIT Bombay participated in the R&D exhibition organised by the Federation of Indian Chambers of Commerce and Industry (FICCI) in partnership with Ministry of Commerce and Industry, Government of India in conjunction with the 13th FICCI Higher Education Summit 2017, a global conference and exhibition at the India Exposition Centre, Greater Noida, Delhi-NCR during November 9-11, 2017. The event was inaugurated by Mr. Sudhanshu Pandey, Joint Secretary, Ministry of Commerce and Industry, Government of India. The theme for the summit was 'Leapfrogging to Education 4.0: Student at the Core'. The event had about 150 exhibitors from top of the line Indian and foreign education Institutions. It attracted a large number of participants from India and abroad. More than 200 international delegates from about 65 countries, 120 universities, institutes and education - technical companies. IIT Bombay exhibited general posters giving a glimpse of the R&D activities at the Institute, academic programmes, industry interactions, tech transfers, posters on technologies developed in the Institute; and IIT Bombay videos. The brochures like 'R&D Highlights', 'Partner with Us', 'Academic Programs', 'Glimpses of Research' and 'Research Facilities' were also distributed to visitors for information dissemination.



**Poster display on 'Glimpses of the R&D activities' at IIT Bombay, at the FICCI Higher Education Summit & Exhibition 2017**



**Visit of Mr. Sudhanshu Pandey, Hon'ble Joint Secretary, Ministry of Commerce and Industry, Government of India, at the IIT Bombay stall during the FICCI Higher Education Summit & Exhibition 2017**

## Magnetic Maharashtra: Convergence 2018

IIT Bombay participated in the R&D exhibition organised by the Maharashtra State Government in conjunction with “Magnetic Maharashtra: Convergence 2018, Global Investors Summit” held at the MMRDA Ground, Bandra-Kurla Complex in Mumbai during February 18-23, 2018. This event was aimed to offer access, insight and opportunity to connect and collaborate with Indian and global industry leaders, academicians, central and state administrations. The event was inaugurated by the Hon’ble Prime Minister of India Shri Narendra Modi in the presence of Hon’ble Chief Minister of Maharashtra Shri Devendra Fadnavis and other dignitaries on February 18, 2018. The event had ~290 exhibitors from industry and government agencies and few from academic institutions. It attracted a large number of visitors from industry, government, students and general public, from both India and abroad. IIT Bombay exhibited few working models and products and general posters giving a glimpse of the R&D activities at IIT Bombay, academic programmes, industry interactions, tech transfers, posters on technologies developed in the Institute; and IIT Bombay videos. The brochures like ‘R&D Highlights’, ‘Partner with Us’, ‘Academic Programs’, ‘Glimpses

of Research’ and ‘Research Facilities’ were also distributed to visitors for information dissemination. About 15 students and staff from four departments, including IRCC, interacted with visitors on all six days giving information about the exhibits and potential applications, and answering other queries. IIT Bombay exhibition was coordinated by Dr. V. Arumugam, IRCC and his team.

## TechConnect 2017

‘TechConnect 2017’ was organised during the Techfest event held at IIT Bombay between December 29-31, 2017 to showcase R&D exhibits (including 125 exhibits - working models, demonstrations, products and posters) from 15 academic units. The event was inaugurated by Shri Manohar Parrikar, Hon’ble Chief Minister of Goa in the presence of Prof. Devang V. Khakhar, Director, IIT Bombay. Stalls from the Academic and Dean (R&D) office exhibited posters on technology development and distributed respective brochures to visitors. Prof. V. Jyothiprakash (Faculty Coordinator), Mr. Divyanshu Prasad (Overall Student Coordinator) and Dr. V. Arumugam (IRCC Coordinator) were the main organisers of TechConnect 2017.

**Mr. Manohar Parrikar, Hon’ble Chief Minister of Goa with Director Prof. Devang Khakhar and the organising team of TechConnect at the inauguration of TechConnect 2017**





#### Publications of Booklets:

The Institute brought out a brochure entitled “Research Facilities”, a compilation of high-end research facilities available at the Institute. The compilation include information for each equipment, such as instrument specifications, location, contact details and typical data that can be acquired from these facilities.

Brochures titled ‘**R&D Highlights**’, ‘**Partner with us**’ highlighting the possible modes of interactions between IIT Bombay and industry were updated.

A brochure titled “**Glimpses of Research Vol.I & Vol.II**” describing the research work of some of the IIT Bombay faculty members was published in the Institute. It was released by Mr. Arun T. Ramchandani of Larson & Toubro Limited during the National Education Day function held on November 13, 2017 in the Institute.

These brochures were distributed in various industrial forums, during Institute events as well as to visitors of the Institute to disseminate information on R&D activities and industry interactions of the Institute.

#### 4. Augmentation of Research Infrastructure

As part of creating and upgrading infrastructure

for enabling R&D activities, the Institute has approved procurement of the following state-of-the-art equipment under MHRD’s Vishwajeet Project Scheme:

- Advanced Mechanical Testing System
  - Dynamics and Imaging of Molecules, Materials and Nano/microdevices
  - Gaton Image Filter (GIF), Electron Energy Loss Spectroscopy (EELS) and Energy Dispersive Spectroscopy (EDS) Attachments for Existing FEG TEM —300 kV
  - High Performing Computing Facility
  - High speed Camera, Thermo PIV System and Polarised Microscope System
  - Multi Angle Light Scattering Spectrometer
  - Powder X-Ray Diffractometer
  - Scanning Electron Microscope
  - Scanning Transmission Electron Microscope
  - Single Crystal Diffractometer
  - Two Photon Lithography Set-up
- In addition, several equipment and facilities were procured from external grants.

#### 5. Intellectual Property (IP) Protection Activities

During the year, 116 patent applications were filed. List of all Indian and international IPR filings & granted are given in Table 4.

**Figure 4:** Patents Applications Filed and Granted during 2017-18

IP type	Applications filed (No.)	Granted (No.)
Indian Patent	96	20
PCT	7	-
US Patent	13	6
Other foreign patent (EU)	-	1
Trademark	4	6
Copyright	6	0
Design	1	3

## Areas of IP filings included:

Biomedical Devices & Biosensors, Chemical Processes, Communication Systems & ICs, Drug Delivery Systems, Electrical Engineering, Electronic & Energy Storage Devices, Memory Devices, MEMS Sensors, Microfluidics, Multilevel Converters, Optics, Photovoltaics, Robotics, Safety and Security, Synthesis of Nano Fibres, Waste Management, 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 MTech/ Dual degree students to file for possible protection. About 810 abstracts were reviewed, out of these about 27 were shortlisted for a possible filing of patent applications and two patent applications were filed and two are in the process of filing.

Proactive efforts continued for licensing of these technologies, products and designs.

Nearly 100 agreements were finalized and signed during the year including those for research collaboration, licensing, non-disclosure agreements, IP transfer, student sponsorships, endowment, material transfers, with industries, organisations, universities and government, both national and international.

## 6. Awards for R&D Activities

### Glucometer Received Government Certification

A glucometer used to test blood glucose, named as 'SYNC' was developed by Prof. Rohit Srivastava and his team, Department



**SYNC - Glucometer used to test Blood Glucose**

of Biosciences and Bioengineering. The prototype received certification for making product and sales from National Institute of Biologicals, Ministry of Health & Family Welfare, Government of India on May 1, 2017. This is the first Indian equipment to get such a certification. This product is developed and being commercialized in the partnership with Biosense Technologies Pvt. Ltd.

### Gandhian Young Technological Innovation (GYTI) Award 2018

SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions), Ahmedabad in association with Biotechnology Industry Research Assistance Council (BIRAC), Department of Biotechnology (DBT), Government of India has established national awards named as 'Gandhian Young Technological Innovation (GYTI) Award' for recognising innovative student projects in engineering, biotechnology, agriculture, pharmacy, material science and other applied technological domains. Three IIT Bombay students won GYTI 2018 awards for their innovative projects and the details are given below. Awardees were felicitated during the Festival of Innovation and Entrepreneurship (FINE) 2018 event held at Rashtrapati Bhavan on 19th March, 2018 by the Hon'ble President of India Shri. Ram Nath Kovind.

Award Name/ Category	Project Title	Award Recipient (Students)	Name of Supervisor(s)
<b>GYTI Award</b>	Design of low cost infrared vein detector	Mr. Trivikram A. (M.Des., 2013-2015 batch), IDC School of Design	Prof. Purba Joshi & Prof. B. K. Chakravarthy, IDC School of Design
<b>GYTI Award</b>	Design of window solar cooker	Avinash Prabhune (M.Des., 2012-2014 batch), IDC School of Design	Prof. B. K. Chakravarthy, IDC School of Design
<b>BIRAC GYTI Award</b>	Smartphone-based impedimetric disposable biosensor for detection of cardiac biomarkers	Debasmita Mondal, Biosciences and Bioengineering & Sourabh Agrawal, CRNTS (current PhD Students)	Soumyo Mukherji, Biosciences and Bioengineering



Mr. Trivikram Annamali, student, IDC School of Design, receiving the award from the Hon'ble President Shri Ram Nath Kovind



Mr. Avinash Prabhune, student, IDC School of Design, receiving the award from the Hon'ble President Shri Ram Nath Kovind

Ms. Debasmita Mondal and Mr. Sourabh Agrawal, students of the Department of Bioscience & Bioengineering, receiving the award from the Hon'ble President Shri Ram Nath Kovind



## 7. Focused Initiatives

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

### Enhancing Industry Partnership

The Institute continued its efforts to enhance its interaction with industry. Visits by industry were managed in a seamless manner by facilitating meetings with faculty having specific areas of expertise and the continued follow-up for initiating projects/collaborations. Agreements were entered in order to establish a formal association.

Nearly 260 Indian and international industries approached the Institute for partnering with the Institute through collaborative R&D projects.

Some of the Industries and PSUs which visited and/ or approached the Institute to explore research collaborations include:

Toray Industries, Reliance, Pentation Analytics, Intel, TATA Steel, Godrej, L&T, Siemens, Hilti, Gland Pharma, Sun Pharmaceutical Industries, Viacom 18 Media, Waman Hari Pethe & Sons, Hindustan Aeronautics Limited (HAL), Bharat Petroleum Corporation Limited (BPCL), A-1 Fence Products, Indofil Industries, Sabic, Teva

Pharmaceutical, Torrent Pharma, Next 47, NTPC Ltd., JCB, Essar Steel, SG Pharma, Ansys, Galaxy Surfactants, Amazon, TATA Autocomp Systems (TACO), OSHO Minerals, Chemarc, GAIL, Mondelez International (Cadbury), Sanguine Oilfield Services, INS Shivaji, Mahanagar Telephone Nigam Limited (MTNL), Schneider Electric, Samsung, Shell, Faurecia, Valeo, SRK Diamonds, TCS-iON, Dow Chemicals, Zycus, Aditya Birla, Vega Controls, Indx Technology, Mercedes-Benz, Hindustan Petroleum Corporation Limited (HPCL), Kirloskar Group, Kalyani Studio, Twinstar Industries, Honeywell, Union Bank, Surat Lignite Power Plant, Spashta Technologies, GlaxoSmithKline, TITAN, C-DoT, Linepro Controls, Intelcap, Zoetis, Fiat India Automobiles, John Deere, Indian Oil Corporation, FCL Ltd. (Facebook), EzyMov, LIC, Gencrest (Samta Foundation), Ripple USA, Bank of Baroda, Radiant Technologies, JSW Steel, IBM, Mantras Green Resources, LG, Coca-Cola, Airbus India, Huawei, Adani Group, NEC Japan, etc.

### Healthcare Research Consortium:

The consortia partners continue to interact on one-on-one basis to carry out multi-disciplinary research.

### Institute Ethics Committee (IEC)

The Institute Ethics Committee reviewed 31 proposals of which 25 were approved and the rest are under review. With increase in the number of proposals, a greater need for awareness programs and trainings is being addressed by the Institute. The Institute has been in the process of streamlining and defining role, workflow and structure of IEC.

### Incentives for R&D

IIT Bombay Research and Consultancy

awards were instituted in 2004 to encourage and recognise the outstanding research and consultancy works carried out by faculty members. These awards are now called as:

- IIT Bombay Research Publication Award
- IIT Bombay Impactful Research Award
- IIT Bombay Research Dissemination Award
- IIT Bombay Early Research Achiever Award

The winners of these awards during the year were as follows:

Award Name	Names of Award Recipients
<b>Research Publication Award</b>	<b>Prof. Samir K. Maji,</b> Department of Biosciences and Bioengineering <b>Prof. Raghavan B. Sunoj,</b> Department of Chemistry <b>Prof. Deepankar Choudhury,</b> Department of Civil Engineering <b>Prof. Bikash Kumar Dey,</b> Department of Electrical Engineering <b>Prof. Dinesh Kabra,</b> Department of Physics
<b>Impactful Research Award</b>	<b>Prof. Abhay Karandikar,</b> Department of Electrical Engineering
<b>Research Dissemination Award</b>	<b>Prof. Sambasivarao Kotha,</b> Department of Chemistry <b>Prof. S. V. Kulkarni,</b> Department of Electrical Engineering
<b>Early Research Achiever Award</b>	<b>Prof. Anirban Banerjee,</b> Department of Biosciences and Bioengineering <b>Prof. Rajarshi Chakrabarti,</b> Department of Chemistry <b>Prof. Rajneesh Bhardwaj,</b> Department of Mechanical Engineering <b>Prof. Aftab Alam,</b> Department of Physics

### Prof. Krithi Ramamritham Award for Creative Research

The Prof. Krithi Ramamritham Award for Creative Research, started from 2016 is instituted at IIT Bombay by Prof. Jayant Ramaswamy Haritsa, Indian Institute of Science, Bengaluru. The award is given to recognise highly creative and original research contribution made primarily at IIT Bombay by a faculty member in any engineering discipline. The award is intended to be given for a specific accomplishment and not for cumulative career performance. The award carries a citation and a cash incentive of INR 1,00,000 (Rupees One Lakh). Prof. Krithi Ramamritham Award for Creative Research for the year 2016 was awarded to Prof. Shivaram Kalyanakrishnan, Department of Computer Science and Engineering in recognition of his significant research contributions in the area of “Theoretical Analysis of Policy Iterations for Markov Decision Problem”.





**Winners of research publications and other awards with guests and officials**

Also, for research excellence, technology development and transfer efforts, the following awards were given during the year are as follows:

Award Name	Names of Award Recipients
<b>S.C. Bhattacharya Award for Excellence in Pure Science</b>	<b>Prof. Krishna P. Kaliappan,</b> Department of Chemistry
<b>H.H. Mathur Award for Excellence in Applied Science</b>	<b>Prof. Amit Agrawal,</b> Department of Mechanical Engineering
<b>H.H. Mathur Award for Excellence in Applied Science</b>	<b>Prof. B. Ravi,</b> Department of Mechanical Engineering
<b>Dr. P.K. Patwardhan Technology Development Award</b>	<b>Prof. Shaibal K. Sarkar,</b> Department of Energy Science and Engineering

The awards recognition included cash awards, research grants and arranging Institute-wide dissemination through lectures and electronic media.

The Research Internship awards were given to bright students across the country to undertake research at IIT Bombay for six months, based on national advertisement and selection process. Each selected intern receives monthly stipend of Rs. 10,000 for six months subjective to students not getting any support from parent organization/ government (MHRD).

- No. of applications received: 397
- No. of interns selected: 77
- No. of interns joined: 58

### **Dissemination/ Outreach for IIT Bombay Academic Community**

Workshop on Central Facilities was held on December 4-5, 2017 to disseminate information about the central facility (CF) - capability, usage and research output to the academic community. Conveners of thirty six central facilities made presentations on technical specification and capability, types of experiments carried out and the usage. About 110 faculty members and students attended the workshop. Parallel Poster Presentations were held, showcasing the detailed research output (technical) obtained from the facilities by the students.

Lectures by domain experts (faculty members from Institute and scientists from

National Centre for Cell Science, Pune) on the work of winners of the Nobel Prize 2017 were organised at the Institute on October 25, 2017.

IP workshop for students, project staff and faculty members was organised at the Institute on February 13, 2018. Workshop had detailed presentations on Institute's Intellectual Policy, IP Protection and Management Process and IP Commercialisation Activity.

A workshop on 'Europe-India IP Dialogue: An enabler for research and innovation in the Health and ICT Sector' was organised at the Institute in collaboration with European Business & Technology Centre (EBTC) and the Federation of Indian Chambers of Commerce and Industry (FICCI), on March 6, 2018. The keynote address was delivered by Dr. O.P Gupta, Controller General of Patents, Designs and Trademark, India, and theme-based talks were given by Mr. Gerard Owens, European Patent Office and IP experts from industry. In addition, breakout sessions were held in the two thematic areas and preparation of discussion paper is underway.

### Safety Activities at the Institute

Keeping in mind the importance of safety while performing R&D activities, safety seminars and online safety tests were conducted in the Department of Energy Science & Engineering for students and staff in September 2017. About 150 persons attended the same. Flyers on laboratory safety were distributed to students during the orientation program in January 2018. Online Safety Compliance Undertaking for students was made mandatory during the registration process from January 2018. Safety posters were distributed to 25 academic units for displaying in laboratories. A workshop on laboratory safety was conducted on March 27, 2018 in the Institute.

### Online Processes

Online interface of R&D activities (in drona & IRCC website) was made more user friendly and few other activities automated in the year were as follows:

- For ERP system: Modifications done in drona system to accommodate and connect to SAP system in parallel with MISEC

system and continuous drona updation for SAP facilitation

- Preparation of document, process & data; training to implementing ASC staff and related activity
- Module for submitting Sponsored projects proposal enhanced- Saving draft version and submitting proposal for 'SEED TAP' category
- Developed interface for Security Section to access all project staff tenure details
- Additional features are added in the existing Central Facilities-User registration portal
- Enhanced Project staff administration module- submitting missed attendance
- Developed interface for sending Project staff related office orders (digital copy) through email to all concerned-Project staff, PI and Dept. Office. Issuing hard copy order is stopped
- Developed online 'Disclosure form' for recording Know-how and its approval process
- Enhanced interface of 'Job opportunity Link' at IRCC website

### Project Manpower

The number of project staff working in various projects as on March 31, 2018 is 1157. Of them, 471 joined during the financial year 2017-18. IRCC stopped issuing hard copy office orders related to project staff administration and digital copy of the same is being sent through email to all concerned-Project staff, Principal investigator and Department office.

# Outreach Programmes

The Continuing Education Programme & Quality Improvement Programme (CE & QIP) Office at IIT Bombay has been actively reaching out to working professional from both academia and industry to serve the competency development and training requirements. A large number of working professionals from industry as well as faculty and students from academia participated and acquired knowledge from short and long term courses during 2017-18.

A number of Short Term Training Programs (STTP), which are fully funded by the All India Council for Technical Education (AICTE) for faculty members of engineering colleges, were conducted. In order to provide college teachers an opportunity to interact with the industry professionals, special efforts have been made to permit a few industry participants as part of the QIP courses, in the normal CEP mode. This model has been appreciated by the teachers as well as the industry personnel, and has also helped to improve the overall effectiveness of the various QIP courses.

Many of Institute's CEP courses for the industry are well received worldwide and continue to attract large participation, both from within as well as from abroad. The courses on "3D Printing", "Urban Drainage Management", "Human Computer Interaction", "Energy Management", "Elements of Chemical Engineering", "Executive Programme in Management", "Leadership Development Program", "Dynamics and Control in State-

Space (DCSS)", "Expo CD and Expo PDI", "Strategies for Organization's Growth", "Finite Element Method and Application", "System Engineering and Principles", "Data Analytics", have all been appreciated by the industry.

The CEP course on "Piping Engineering" (contact version) reached another milestone and crossed its 72nd edition in 2017. About 10000 engineers have registered in the last 25 years. The online version of the course on "Piping Engineering" commenced in July 2009 and has continued during the current year. Till now, over 500 participants have registered from all over the world and the list is expected to grow many folds in future.

In terms of the overall performance of CE&QIP during 2017-2018, a total of 122 CEP courses were conducted with about 1594 participants from across different disciplines as well as industries, organizations and institutions, with a revenue of around 6.31 crore. Under the QIP category, 2 MTech and 12 PhD students from AICTE approved engineering colleges were admitted. In addition, 5 teachers were inducted into PhD programme under the advance admission scheme. They joined the Institute for the regular programme from July 2018. Further, 84 short-term courses (STC) were conducted for college teachers under the sponsorship from AICTE and a total of 550 participants from various engineering institutions/ colleges attended these courses.

# Faculty Achievements and Recognitions

During the year, 25 faculty members on regular basis and 13 on contract basis were appointed. The number of full-time faculty members on the roll of the Institute has risen to 643 comprising 301 Professors, 01 Professor (Contract), 171 Associate Professors, 152 Assistant Professors (Grade-I), and 18 Assistant Professors (Grade-II). In addition, there are 44 adjunct faculty members and 151 post-doctoral fellows on the roll. Around 20 faculty members retired – five of whom were re-employed and six resigned during the year.

The Institute provided financial assistance to 354 faculty members for participating in international conferences. In addition, 150 faculty members travelled abroad for attending international conferences using external funding and three 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. K. Suresh**, Department of Chemical Engineering, has been selected for CSIR-CSMCRI Chemcon Distinguished Speaker Award 2017 by the Indian Institute of Chemical Engineers (IICChE).

**Prof. A. S. Khanna**, Department of Metallurgical Engineering and Materials Science innovation has been selected for FICCI Chemical and Petrochemicals Award 2017 under the Category of New Innovation by Academia. This is being given for the invention of Synthesis of Industrial Scale Graphene by new eco-friendly method and its application to form high performance organic coatings.

**Prof. Abhay Karandikar**, Department of Electrical Engineering, has been appointed as a part-time member of the Telecom Regulatory Authority of India (TRAI) for a period of 3 years.

**Prof. Abhay Karandikar**, Department of Electrical Engineering, has featured in a cover story entitled “Architects of Digital India” published in Voice and Data magazine December, 2017 issue.

**Prof. Abhishek Gupta**, Department of Mechanical Engineering and his team won the world finals of this year’s “American Society of Mechanical Engineers (ASME)”, students design competition held at Tampa, Florida, USA.

**Prof. Amit Agrawal**, Department of Mechanical Engineering, has been selected as Fellow of the National Academy of Sciences, India.

**Prof. Amol A. Gokhale**, Department of Mechanical Engineering, has been selected as the Vice President of Indian Institute of Metals.

**Prof. Anand B. Rao**, Centre for Technology Alternatives for Rural Areas, has been selected as a Lead Author for the Intergovernmental Panel on Climate Change (IPCC) Assessment Report 6 (AR6) for the Working Group-III.

**Prof. Anand Khanna**, Department of Metallurgical Engineering and Materials Science, has been conferred with Life Time Achievement Award during an International Conference on “New Vistas in Surface Engineering & Corrosion”, held in September 2017. The Award was given by The Society for Surface Protective Coatings India in recognition of his excellent academic and research work.

**Prof. Anil Kottantharayil**, Department of Electrical Engineering, has been elected as a ‘Fellow of the Indian National Academy of Engineering’.

**Prof. Anil Kottantharayil**, Department of Electrical Engineering, has been selected for Indian Electronics and Semiconductor Association (IESA) Technovation 2017- Techno Mentor award.

**Prof. Anil Kumar**, Department of Chemistry, has been awarded this year's NASI-Reliance Industries Platinum Jubilee Award for Application Oriented Innovations.

**Prof. Anindya Dutta**, Department of Chemistry, has been chosen to receive the Chemical Society of India Bronze Medal in recognition of his contributions to Chemistry.

**Prof. Anindya Dutta**, Department of Chemistry, has been selected as the Fellow of the National Academy of Sciences, India.

**Prof. Bijnan Bandyopadhyay**, Systems and Control Engineering (SysCon) has been selected as IEEE Fellow for his contributions in the field of discrete-time, multi-rate, output feedback sliding-mode control.

**Prof. C.P. Rao**, Department of Chemistry, has been chosen to receive the Chemical Research Society of India silver medal for his contributions to research in Chemistry.

**Prof. Chandra Venkataraman**, Department of Chemical Engineering, has also been elected as a Fellow of the Indian Academy of Sciences (IASc).

**Prof. Chandra Venkataraman**, Department of Chemical Engineering, has been selected as Fellow of the National Academy of Sciences, India.

**Prof. Chetan Singh Solanki**, Department of Energy Science and Prof. Jayendran Venkateswaran, Industrial Engineering and Operations Research) led Solar Urja Lamp Project, as implemented by the District Collector in the district of Dungarpur, Rajasthan received the prestigious Prime Minister's Award (certificate and trophy) under Innovation Category. The award was presented by the Hon'ble Prime Minister Mr. Narendra Modi to the Collector Dungarpur, on the occasion of Civil Services Day 2017 held in New Delhi on April 20-21, 2017.

**Prof. Debabrata Maiti**, Department of Chemistry, has been invited to join the International Advisory Board of "Chemistry", an Asian Journal, one of the flagship journals of Wiley-WCH.

**Prof. Debabrata Maiti**, Department of Chemistry, has been selected to receive the "OPPI Young Scientist Award 2017", instituted by Organisation of Pharmaceutical Producers of India.

**Prof. Deepankar Choudhury**, Department of Civil Engineering has been appointed as the new Co-Editor (Associate Editor) of ASCE International Journal of Geomechanics, published by the American Society of Civil Engineers.

**Prof. Deepankar Choudhury**, Department of Civil Engineering, has been selected as Fellow of the National Academy of Sciences, India.

**Prof. Deepankar Choudhury**, Department of Civil Engineering, has been selected for 'Prof. Chandrakant S. Desai Medal - 2017' for his outstanding contributions in research in the domain of Computational Geomechanics, by International Association for Computer Methods and Advances in Geomechanics (IACMAG), AZ, USA.

**Prof. Devang Khakhar**, Department of Chemical Engineering, has been awarded D M Trivedi Lifetime Achievement award by the Indian Chemical Council, for his contributions to Indian chemical industry (education and research).

**Prof. Dulal Panda**, Department of Bio-science and Bio-Bioengineering, has been selected as the fellow of Indian National Science Academy.

**Prof. G. Naresh Patwari**, Department of Chemistry has been selected for Shanti Swarup Bhatnagar Prize 2017 in Chemical Science.

**Prof. Hetu Seth**, Department of Earth Sciences, has been awarded M. R. Srinivasa Rao Award 2017 in Petrology of the Geological Society of India.

**Prof. Inder K. Rana**, Department of Mathematics, has been elected as President of "The Association of Mathematics Teachers of India (AMTI).



**Prof. Jayesh Bellare**, Department of Chemical Engineering, was conferred the Lifetime Achievement award by the Vice President of India. The Young Scientist award was conferred on Mr. Prashant Chikramane (PhD-2013). Their research group includes Prof. A.K. Suresh, Department of Chemical Engineering, Dr. S.G. Kane, IIT Bombay alumnus, Dr. Mayur Temgire (PostDoc), Mr. Abhirup Basu (MTech-2017), Ms. Neha, Ms. Neelakshi and others. The event organized by Ministry of AYUSH CCRH-WHD Conference was held during April 10-11, 2018 at Delhi. The awards recognized their path-breaking research on the structure of Homeopathic remedies in the realm of Nanotechnology, and extensive studies on the hormetic biological effects of nano particles.

**Prof. K. Ramasubramanian**, Department of Humanities and Social Science, has been conferred with Madhava Ganita Puraska instituted in the name of the famous Kerala mathematician Madhava, who for the first time in the history of mathematics, arrived at the infinite series for Pi, sine and cosine functions - almost three centuries before Newton and Leibniz.

**Prof. Milind Atrey**, Department of Mechanical Engineering, has been appointed as the Founding Chair of the Institution of Mechanical Engineers' (UK) Process Industry Division's India Technical Centre, which will be headquartered in Mumbai for a period of 3 years in an honorary capacity.

**Prof. Nina Sabnani**, Industrial Design Centre, won the Rajat Kamal Award for the best animation film "Hum Chitra Banate Hain" directed by her, at National Film Award. It was produced by IDC, IIT Bombay and animated by Mr. Piyush Verma and Mr. Shyam Sunder Chatterjee.

Film made by **Prof. Nina Sabnani**, Industrial Design Centre, "We Make Images" ("Hum Chitra Banate Hain") has been selected for this year's German International Ethnographic Film Festival (GIEFF), due to be held from May 9 - 13, 2018 in Koblenz, Germany

**Prof. Parinda Vasa**, Department of Phys-

ics, has been awarded Young Career Award in Nano Science & Technology - 2018, by the Department of Science and Technology (DST).

**Prof. Parinda Vasa**, Department of Physics, has been awarded 'B.M. Birla Science Prize' and has been elected as a member to the 'International Union of Pure and Applied Physics (IUPAP) Commission on Laser Physics and Photonics (C17)' for the period 2018-2000.

**Prof. Nina Sabnani**, has also won the Animation Gold Award at the 12th Indian Documentary Producers' Association Awards 2017 for the film 'Hum Chitra Banate Hain' directed by Prof. Sabnani.

**Prof. R.B. Sunoj**, Department of Chemistry has joined as an associate editor of WIREs: Computational Molecular Science for a term of three years.

**Prof. R. B. Sunoj**, Department of Chemistry, has joined the Editorial Advisory Board of ACS CaBoard from January 2018.

**Prof. Rajesh Gupta**, Department of Energy Sciences and Engineering has received NDT Best Paper Award 2017 in Industrial applications. This award was given by Governor of Tamil Nadu in Chennai and jointly sponsored by Indian Society For Non-Destructive Testing & M/s Eastwest Engineering & Electronics Co.

**Prof. Rangan Banerjee**, Department of Energy Science & Engineering, has been elected as 'Fellow of the Indian National Academy of Engineering'.

**Prof. Rohit Srivastava**, Department of Biosciences and Bioengineering, has been selected for "National Bioscience Award for Career Development 2016" by Department of Biotechnology, Government of India.

**Prof. Rohit Srivastava**, Department of Biosciences and Bioengineering, research work carried out by him and his group on "Degradable NIR responsive plasmonic nanoshells for photothermal cancer therapy

and diagnosis” has been given the prestigious ‘Cancer Research Foundation, India (CRFI) Best Research Award 2018’.

**Prof. Rohit Srivastava**, Department of Biosciences and Bioengineering has developed a medical device for detection of renal diseases. The device was selected for display as an exhibit in exhibition held in Parliament House in July 2017.

The Innovation “IIGPU400364 –SelfCervi: a device for real-time self screening of cervical cancer” by **Prof. Rohit Srivastava**, Tata Innovation Fellow, INAE Young Associate, Department of Bio-sciences and Bio-engineering, IIT Bombay, his student **Mr. Shantanu Phatak**, NanoBios Lab, IIT Bombay and other team members **Ms. Mukti Vats**, NanoBios, IIT Bombay, **Dr. Shital Munde**, MD pathology student, KEM Hospital, Mr. Kunj Vora, student intern, NanoBios Lab, IIT Bombay and mentors **Prof. Dr. Padmaja Mavani**, Sr. Gynecologist, KEM Hospital and **Dr. Abhijit De**, PI, ACTREC has been selected as one of the University Challenge winners of the DST – Lockheed Martin – Tata Trusts India Innovation Growth Programme (IIGP) 2.0 for 2017.

**Prof. Ronita Bardhan**, Centre for Urban Science and Engineering, has been awarded the prestigious ‘Charles Wallace India Trust Fellowship’ (2018-19) at the University of Cambridge - CRASSH, Wolfson College.

**Prof. S. Bhargava**, SJM School of Management, has been selected for the award of outstanding contribution to education for 2017, by the Silver Jubilee edition of B- School Affairs.

**Prof. Samir K. Maji**, Department of Biosciences and Bioengineering, has been selected for “National Bioscience Award for Career Development 2016” by Department of Biotechnology, Government of India.

**Prof. Sanjeev Srivastava**, Department of Biosciences & Bioengineering two short films/ documentary on proteomics have been selected for screening in various international film festivals.

**Prof. Saurabh Lodha**, Department of Elec-

trical Engineering, has been selected for the prestigious Swarna Jayanti Fellowship Award for the year 2016-17, in the field of Engineering Science.

**Prof. Shamik Sen**, Department of Bioscience & Bioengineering, has been selected for the prestigious Swarna Jayanti Fellowship Award for the year 2016-17, in the field of Life Science.

**Prof. Shripad Mahulikar**, Department of Aerospace Engineering has been nominated on the Academic Council of the Solapur University, Solapur.

**Prof. Siddhartha Chaudhuri**, Department of Computer Science and Engineering recent work on a generative model of 3D shape structure, using recursive autoencoders, was chosen to be featured in a press release of the Association for Computing Machinery (ACM) via the American Association for the Advancement of Science (AAAS).

**Prof. Sourav Pal**, Department of Chemistry, has been elected as a member of the Council of Indian National Science Academy. Prof. Pal has also been nominated as a member of the Editorial Advisory Board of Journal of Physical chemistry (JPC) for 3 years.

**Prof. Souvik Banerjee**, Department of Civil Engineering, has been appointed as Associate Editor for ASME Journal of Nondestructive Evaluation, Diagnostics and Prognostics of Engineering Systems.

**Prof. Souvik Mahapatra**, Department of Electrical Engineering, has been awarded the ‘IBM Faculty Award’.

**Prof. Souvik Mahapatra**, Department of Electrical Engineering, has been elected as a Fellow of the Indian Academy of Sciences (IASc).

**Prof. Subhasis Chaudhuri**, Department of Electrical Engineering, has been selected for this year’s Distinguished Alumnus award of IIT Kharagpur. The award was conferred on him during IIT KGP convocation ceremony held in August 2017.

**Prof. Sudhir Ghorpade**, Department of Mathematics, has been elected as the President of the Indian Mathematical Society for the year 2018-19.

**Prof. Supreet Saini**, Department of Chemical Engineering, has been selected for the INAE Young Engineer Award for the year 2017.

**Prof. Suryendu Dutta**, Department of Earth Sciences, has been selected for the prestigious SwarnaJayanti Fellowship Award for the year 2016-17, in the field of Earth and Atmospheric Sciences.

**Prof. Suvarn Kulkarni**, Department of Chemistry, has been invited to become a Member of the Editorial Board of “Carbohydrate Research” for a period of 3 years.

**Prof. T. Eldho**, Department of Civil Engineering has been selected for “Eminent Water Resources Scientist Award - 2017” instituted by Indian Water Resources Society (IWRS).

**Prof. V. Jothiprakash**, Department of Civil Engineering has been selected for “Academician Award” by Construction Industry Development Council, CIDC, (Established by Planning Commission, Government of India and Construction Industry).

**Prof. V. M. Gadre**, Department of Electrical Engineering has been awarded Indian National Science Academy (INSA) Teachers Award 2017.

**Prof. V. M. Gadre**, Department of Electrical Engineering, has been nominated as a member of IIT council. IIT council is the apex body for IITs chaired by the Minister of MHRD.

**Prof. V. S. Raja**, Department of Metallurgical Engineering and Materials Science, has been selected as the Second Vice President (2017-2020) of International Corrosion Council during the International Corrosion Congress held at Prague during September 3-7, 2017. This is in recognition for his excellent academic and research work.

**Prof. Varun Bhalerao**, Department of Physics has been selected as an Associate of the Indian Academy of Sciences.

**Prof. Venkat Gundabala**, Department of Chemical Engineering research work with the research scholar Mr. Danish Egbal has received the Best Oral Presentation award at the “5th International Conference on Microfluidics and LAB-ON-A-CHIP.

**Prof. Vikram Vishal**, Department of Earth Sciences has been awarded the INSA Young Scientist Medal-2017.

**Prof. Vikram Vishal**, Department of Earth Sciences, has been selected as the member of INSA Young Academy of Sciences.



# Student Activities

## Student Gymkhana Activities

The students at IIT Bombay explore their interests in a plethora of activities. There are excellent recreational facilities for sports, including gymnasiums, athletics tracks, swimming pools, and courts for sports like tennis, basket ball, volleyball, hockey, football and cricket, 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 the Sports Officers, Chairman, Sports Committee and Dean (Students Affairs).

For effective practice throughout the two semesters, seven full-time coaches from India's best physical education Institute, viz., NIS, Patiala as well as 11 part-time coaches across all Inter-IIT sports were appointed in September 2017. The Institute has also appointed one Sr. Sports officer on a permanent basis.

During the year, the following infrastructural work were completed. The re-layering of Badminton courts surface was completed and the number of courts were increased from 5 to 8. New gymnasium equipment worth 1.2 cr split across 3 consignments were procured and installed. The management has been outsourced by procuring gym management services for the new gym. A comprehensive implementation plan was prepared and approval has been sought for setting up of biometric machines, telephone lines and Wi-Fi at major sports venues for regulated entry of alumni, staff and students. Digital clocks at different sports venues have been installed and work has been initiated on re-soiling of long jump pit and shifting of throw pits to old frisbee field.

Increase in girls participation in sports activities was noticed. The Institute Girl's Squash team was formed for the first time and the team won gold at Udghosh, IIT Kanpur. The Institute had organised free of cost beginner camps in football, cricket and hockey exclusively for girls under the 'Go Girl Go' initiative, which saw participation of more than 80 girls. Institute-wide Girls' Football

Open camp with participation of more than 30 girls was conducted for the first time. A series of free-of-cost self-defense workshops exclusively for girls were organised on the occasion of International Women's Day.

## Website and Social Media Outreach:

The first-ever IIT Bombay Sports' Blog saw an annual reach of more than 50000 views and e-Newsletter 'Kreedha' on the IIT Bombay Sports website featuring multiple editorial series including 'Tales of Glory' and 'Adventure Diaries' was published during the year. Through various sports activities on the campus, the students have built their media presence across the widely known social media platforms – YouTube, Instagram and Twitter. This has led to a combined subscription of 25000 followers.

IIT Bombay participated in the 52nd Inter-IIT Sports Meet held in December at IIT Kanpur. Inter-IIT Championship winners were provided Casio G-Shock watches and a grand celebratory gala dinner was organised which was graced by the Director of IIT Bombay.

**New Sports Clubs:** IIT Bombay introduced 'IIT Bombay Runners Club' to unite the community of 200+ runners. The club had organised Institute's first ever Runathon (4 hrs continuous run) and Run for Unity on the National Unity Day for faculty, staff and the student community. Community of sports lovers in the Institute was catered by introduction of clubs for popular sports like Formula1, WWE, Moto GP, NBA to bring likeminded people together.

The IIT Bombay's Runners Club in collaboration with Mood Indigo and HA Council also organised first ever standard Half-Marathon which saw participation by more than 3000 runners from across Mumbai, to support the noble social cause of Stem-Cell Donation. For effective interaction of freshmen with the Inter-IIT team and continuous feedback, Institute has implemented the NSO mentors scheme. Two new NSOs, viz., Water Polo and Chess have been approved. The

year-long fitness programs, catering to more than 5000 IIT Bombay residents facilitating flexible subscriptions, i.e. complete freedom to choose weekly slots was implemented with novel fitness activities such as Zumba, Aqua Zumba, Pilates, Calisthenics and Military boot camps. A week dedicated to free-of-cost self-fitness morning sessions called 'Fitness Week' was conducted by professional trainers at hostels during 2017-18. As part of 'Sport of the Month' initiative, introductory workshops were organized for unconventional sports which aren't accessible to majority like golf, parkour, ultimate frisbee and longboarding. India's first ever Quidditch and curling events were also hosted at IIT Bombay under this initiative. A total of 750 participants took part across the 6 editions of 'Sport of the Month'.

**Cultural Activities:** The student cultural activities in the institute saw huge growth in 2017-18 spearheaded by the move to inculcate hostel culture, taking freshers into account. Some of the activities which were conducted are:

- **Freshman Professional Amateur-Arcade:** The Freshers Cultural Competition with the revamped Professional Amateur format was initiated in September. The freshers paired up with the seniors from their hostels and put up some mesmerising performances in genres of dance, music and dramatics along with literary arts and speaking arts competitions.
- **Cultural School Courses:** The year saw the greatest number of cultural school courses held in recent times with new and unexplored arenas like standup comedy and cooking. A total of three rounds were organised - Summers, Autumn and Spring.
- **'Ye India Ka Time Hai' Concert:** A fusion rock concert was held by eminent musicians from Mumbai for MHRD's Ye India Ka Time Hai programme followed by the national pledge. A group discussion was also held in between at the Institute's Convocation Hall to discuss various national issues with the student body of the Institute and the professors alike.
- **Ek Bharat, Shreshtha Bharat:** A total of five sessions were held in different art forms to promote national unity amongst the student community. Different Indian states were paired and performances were put up based on regional culture and history.
- **Inter IIT Cultural Meet:** IIT Bombay participated in the 2nd Inter IIT Cultural meet held at IIT Kanpur in all the 32 competitions with a contingent size of 128. IIT Bombay showed exemplary performance and won the dance, fine arts and design, film and media trophies while winning the second position overall.
- **Institute Events:** The Institute Cultural Council with the help of Cultural Chairperson and NSO Cultural students and instructors performed a musical programme on January 26, August 15 and October 2, 2017 (Anjali). Along with this, a regional performances were put up on the Matrabhasha Divas.
- **Flagship Events:** The Cultural Clubs participated in the Institute Flagship Events called Theatrefest (The three day theatre plays extravaganza), Virasat (The Institute Classical Music event), Surbahaar (The Institute musical extravaganza), AIDS (Annual Insync Dance Show), Institute classical and folk arts night and finally Kaladarshan - the annual photography and fine arts exhibition.
- **Club Expansion:** The lifestyle club of the Institute had a major expansion into activities of fashion designing, fashion modelling and cooking. The Vaani Club expanded from being the Hindi Arts Club to Indian Languages club with activities happening in 4 Indian languages this year. The Dance Club expanded its reach to include street dance culture. The Dramatics Club had a major revamp with inclusion of street play and a huge



Participants performing at PAF 2018

boost to writing culture was given by encouraging original scripts.

- **Performing Arts Festival (PAF):** The first PAF “Sandarsh” was performed on March 28, 2018 by hostels 1, 3, 8, 10, 12 and 16B. It showed the importance of perspective in human lives. The second PAF “Khaled” was performed on April 2, 2018 by hostels 2, 7, 9, 14, 15B and 15C. It was based on the infinite loop of creation and destruction. The third PAF “Aseer-E-Hayat” was performed on April 7, 2018 by hostels 4, 5, 6, 11, 13 and Tansa. It was based on the Pakistani prisoners of war in the year 1965.

**AAVHAN 2017-18:** Aavhan was made a complete college event, as envisioned at the start, in just its second edition. It brought about an y-o-y increase of 100 per cent in the total prize money, and increased the total footfall of the fest from 2000 to 5000 - including entire contingents of IIT BHU, IIT Kanpur, IIT Dharwad, IIT Goa, LNMIIT, IIT Delhi, CoEP as well as various colleges in Mumbai. The team has successfully organised national level tournaments in all Inter-IIT sports on the same weekend promoting intra-contingent bonding. The overall budget of Aavhan was increased by raising more resources through new sponsors like Casio, Redbus, Nivea, Mumbai City FC, along with an increase in the number

of collaborations from 3 to 25. Aavhan team successfully organised national level tournaments in all Inter-IIT sports on the same weekend promoting intra-contingent bonding. The team has collaborated with media bodies like WittyFeed, ATK.T.in to increase visibility of the fest.

## TechFest

IIT Bombay’s annual international science and technology festival called TechFest is well established as Asia’s Largest Science and Technology festival patronized by UNESCO, UNICEF, SAYEN, CEE and Make In India. The event was held during December 29-31, 2017 and witnessed a footfall of more than 175000 people comprising mainly of the youth from across the nation and an outreach of over 2500 colleges across India and over 500 overseas. The theme for this year’s edition of Techfest was ‘Digitization, Sustainability and Bio-Technology’. Some of the activities organised as a part of Techfest 2017 are as follows:

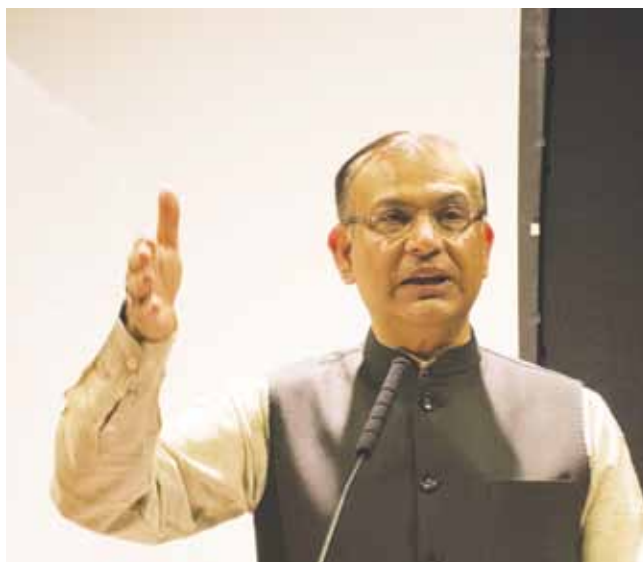
**International Robowars** - In 2009, Techfest, IIT Bombay became the first organisation to introduce Robowars as a competition in India. Once again in the 21st edition, Techfest pioneered the organisation of the first and largest International Robowars in India.

More than 300 robotics teams from





**Robowar at TechFest 2017**



**Hon'ble Minister of State for Civil Aviation Mr. Jayant Sinha at TechFest 2017**

across India registered for the International Robowars competition. Over 100 abstracts in the 120lbs weight category were received. A total of 48 teams were shortlisted for the matches at Techfest. A featherweight 30 lbs category was added with the motive of promoting Robowars within upcoming teams (so that they may participate with a lesser budget and effort). Twelve teams were invited to Techfest for the matches of the same. A lively floating crowd of more than 500 was entertained during the day while the night shows witnessed an audience of more than 2000 people.

**Lecture Series:** A total of 15 lecture sessions were conducted during Techfest in a span of 3 days. These included 12 keynote speaker sessions, two panel discussions, and one interview session. The fest conducted the interaction session with world's most advanced humanoid, Sophia. This has been its first public appearance in India. The keynotes were delivered by Shri Manohar Parrikar, Hon'ble Chief Minister of Goa and Former Defence Minister of India and Shri Jayant Sinha, Hon'ble Minister of State for Civil Aviation. A panel discussion was organised with the participating teams of Google Lunar X Prize,

Puli and Synergy Moon about the challenges in developing a rover for moon.

**Exhibitions:** 'Exhibitions' is one of the distinguished sector of Techfest which provides an opportunity to see what the world has achieved and is trying to achieve through technology. The event, this year, witnessed more than 20 exhibits from countries across the world and from elite universities like Nanyang Technological University, and St. Petersburg University. It also showcased some of the most impressive exhibits from India consisting of Indian Army, Indian Navy and DRDO. This year's exhibitions also witnessed participation from Google Lunar Xprize team.



**Competitions:** Techfest 2017-18 organised 17 competitions from diverse fields ranging from robotics, coding, data analytics, racing to industrial solutions. Over 35000 students registered for these competitions from 2500 colleges across India and 500 colleges abroad. As part of National Outreach of Techfest, the competitions were held in four cities viz in Jaipur, Bhopal, Hyderabad and Mumbai. The International Robotics



Former Finance Minister Mr. P Chidambaram and former Chairman and co-founder of Infosys Mr. N R Narayana Murthy in panel discussion on GST and Demonetisation at the Mood Indigo 2017

Challenge was held in four countries viz. Egypt, Syria, Bangladesh, and Nepal. Finals of the competition were held at Techfest, IIT Bombay in which first and third position were bagged by Indian teams, thus, providing Indian teams a platform to compete at the international level.

**Techconnect:** The event showcased 126 projects by more than 250 BTech/ MTech students and witnessed about 30000 visitors, including 50 professors, from more than 15 academic departments and laboratories.

#### **Sanitation & Health Education (SHE):**

A social initiative to educate women on menstrual hygiene by distributing sanitary napkins and educating more than 15000 women across 37 villages in Maharashtra and Uttarakhand was launched during Techfest. Ms. Taapsee Pannu, Bollywood actress was present at the launch of the initiative and the vehicle was flagged off by Prof. Soumyo Mukherji, Dean (Student Affairs), IIT Bombay.

**Techfest – Science Olympiad Foundation (SOF):** Techfest in association with Science Olympiad Foundation and ISRO covering more than 45000 schools and 400000 students organised innovation challenge during Techfest. Top 10 students received the golden opportunity to visit Vikram Sarabhai Space Centre, Kerala and observe the rocket launch.

**Technoholix:** Technoholix is the cultural part of the Techfest. After all the technology exhibition, lectures and competitions

throughout the day, cultural events commenced in the night to cheer up the participants with shows and events full of technology and creativity. The Technoholix during the fest organised ‘Maxwell The Bubbleologist (London, Uk) – Bubble Show, presenting the formation of bonds with refraction and reflection patterns’, and Illuminati (India) – LED Tron Dance show, the Special Winner of India’s Got Talent Season One Competition.

## **Mood Indigo**

The annual cultural festival Mood Indigo, held during December 22-25, 2017, saw an overwhelming response from the youth of the country who came to IIT Bombay to witness the four day extravaganza. The festival witnessed participation from more than 1700 colleges pan India and saw a footfall of 1,41,000. The four-day fiesta centered around the theme of a Carnival (La Fete Carnaval).

**Proshows:** The illusion fest organized this year during the MOOD Indigo received a great response from the audience with the Norwegian magician Mr. Alexx Alexander leaving them awed with his exceptional tricks. Rebranding the Litfest as Eloquence this year, it went international with Jeffrey Archer endorsing it and inviting people to the festival. It also featured eminent personalities like Mr. P. Chidambaram and Mr. Narayan Murthy (who discussed issues like GST and Demonetisation), Mr. Cyrus Broacha, Ms. Shazia Ilmi, Mr. Neeraj Pandey, Mr. Manoj Bajpai, Mr. Rakeysh Omprakash Mehra

and Mr. Madhur Bhandarkar. Adding a new touch with Slam Poetry to the Eloquence, Ms. Aranya Johar, Yahya Bootwala and Mr. Gaurav Tripathi were also invited. Film actor Mr. Akshay Kumar with co-actors of the movie 'Padman' Mr. Kartik Aryaan and Mr. Manoj Bajpai also attended the fest. The renowned Mr. Biswa Kalyan Rath and Ms. Mallika Dua were the major highlights of the Humorfest treating the crowd with their insane performances along with Mr. Sunil Pal. The international music festival had crowd relishing the performance from Kutle Khan, in addition to bands like Paradigm Shift, and the exiting Symphony Orchestra of India. Mood Indigo saw performances from artists belonging to various cultures from Israel, Taiwan, Norway, Portugal, Denmark, and Netherlands. More than 50 interactive and DIY workshops ranging from bartending, script writing to capoeira, graffiti were organised to make the festival memorable.

**Pronites:** Mood Indigo 2017 organised exciting and talented acts by performances like the Anand Bhaskar Collective and Sparsh. Living upto the legacy of International acts, Haken, the torchbearers of modern progressive metal music took stage for the first time in India with people flying in from all parts of India, even the North-East to watch the band live. Fusion nite has always been known to feature rare and exclusive talent, ace musician/producere Clinton Cerejo headlined the night with a great set. EDM Nite featured the famed musician duo of Bassjackers from the Neitherlands and India's electronic sensation Shaan Singh. Popular Nite saw contemporary Indian singer Amit Trivedi and singer Jonita Gandhi and guitar sensation Rhythm Shaw. For the first time in a college concert, Mood Indigo featured live art showcase by Asia's Got Talent fame Vilas Nayak. The 3D interactive visuals and the overall production made the concerts more engaging and interactive for the audience.

**Competitions:** Competitions this year at Mood Indigo reached new heights with International participation by teams from Sri Lanka. Face of Genre program was introduced wherein eminent personalities like Anupam Kher promotes the competitions, and mentores the participants for the final rounds

of the competitions. While the flagship competitions in dance, music and dramatics stayed the point of attraction, what captivated people's minds were the novel competitions in various genres like journalism, digital arts and lifestyle. To add a cultural flavour to the festival, various competitions in the classical and folk arts genre were also introduced. Entry of competitions in niche fields like improvisational theatre, rap, photography and folk dance increased participation by 12%. Under the "Live Your Passion" campaign, the participants received various incentives including airing of the finals of the competition on Dance India Dance, world renowned Balcony TV, NCPA, Jaipur International Films Fest, Canvas Laugh Club, performances and exhibitions at prestigious stages like Kala Ghoda, Indian Arts Festival and summer internships in institutions like Spic Macay, Ritam Banerjee, True School of Music. The competitions saw participation from over a thousand colleges, panning across various cities like Mumbai, Delhi, Jaipur, Hyderabad and Bangalore. The multicity campaigns, our on-ground eliminations, expanded its reach to 7 major cities. The participants also participated in the Swab to Save Campaign.

**Social Cause - "Swab to Save":** Stem Cell Donation Awareness Campaign in its efforts of giving back to the society was also organised for social cause. A multicity awareness and registration drive was carried out as a part of this. To promote the cause, the team had organised IIT Bombay Half Marathon. The Run saw participation from more than 3500 runners getting coverage from media houses in the city.

**Media and Publicity:** The team had an extensive coverage deal from the media partners like Viacom18 for the publicity of the festival on all platforms including TV, facebook, twitter, snapchat and instagram. To reach to all sections of crowd, the team revamped its blog and also released an online newsletter for the first time. In addition, a newsletter was published in association with DNA. A lot of pre-festival buzz was created via innovative pre-MI events like fan gatherings at various locations along with an exhaustive coverage plan. The Media Team



continued other avenues of publicity like outdoor hoardings and multiplexes.

## Entrepreneurship Cell (E-Cell)

The E-Cell at IIT Bombay was founded with a vision to create an entrepreneurial ecosystem by enabling an easy and efficient interaction between students, faculty, aspiring and existing entrepreneurs, mentors and investors. E-Cell has worked to spread awareness and promote latent entrepreneurship spirit amongst people by conducting four major initiatives:

### a) The Entrepreneurship and Business Club (EnB Club)

The EnB Club tried to foster the latent entrepreneur inside all the IIT Bombay students by catering to the requirements of all the students having different levels of entrepreneurship skills. Several activities were conducted some of which are:

**Eureka ! :** Eureka has been independently recognized as Asia's largest Business Plan Competition by CNN and Thomson Reuters. Eureka provides a platform for potential ideas and early stage start-ups to evaluate their plan in the risk-free environment of a competition. This year more than 10000 entries were received for the competition, breaking the records set during previous years. Top 80 semi-finalists of Eureka! 2017 Business Model Competition received complete access to startup course at 'INSEAR Business School'. Winners of Eureka! 2017 Business Model Competition is said to get direct entry into Wharton India Startup Challenge hosted by the Wharton India Economic Forum. The winners of Eureka will also get a direct entry to the semi-finals of B-Model Competition of the Singapore Management University (SMU). Their trip will be sponsored depending on the budget of SMU.

### National Entrepreneurship Challenge:

This was launched with a vision to promote entrepreneurship amidst all the college campuses in India. Overall, 650 entries were registered and established E-Cells in their colleges.

**Swacch:** The EnB Club has executed a large scale social initiative called 'Swacch' for the first time in the history of E-Cell. The one-day event witnessed participation of more than 500 people and collection of more than 1200 kg waste with a mission of cleaning up Juhu Beach. The club has successfully gathered sponsorship from Clean India Journal and also received donation in kind (all the cleaning and safety equipments) worth Rs. 50000 for execution of the social initiative.

**Enlighten:** The EnB club has carried out complete transformation of the initiative including the vision, website design, publicity, strategies, contents during the year. During the transformation phase, the number of videos were increased from 5 to more than 55 and also categorised in different domains. The Dictionary in Entrepreneurship which was strategic, completely new and quite different from the existing established platform was introduced. The dictionary includes more than 150 words which were curated and selected after an extensive research in the domain from various online and offline platforms. The number of blogs increased to more than 100 in the year.

**The Entrepreneurship Summit:** The Entrepreneurship Summit (E-Summit) is a confluence of visionary students, professionals or anyone who wishes to be one of those crazy rebels who will change the world, start his own business or fund a business and become a trend-setter. It is the annual flagship event of E-Cell, IIT Bombay. Various activities were conducted during this 2-day Summit. Some of them are:

- **Speaker Sessions and Panel Discussions:** A large number of speaker sessions were conducted with speakers from all the fields related to entrepreneurship. Some of the invited speakers for Business Conclave were: Tushar Pradhan (CIO, HSBC); Pritin Kumar (Partner, Deloitte); Akhil Handa (Fintech Head, BOB) and Kishore Poduri (HR Head, DBS Bank). This year's panel discussion was focussed on critical issues like 'Building Scalable and Sustainable Business', 'Blockchain', 'Digital Payments', 'Missing Bits of Startup Ecosystem', 'What every Tech

Entrepreneur should know’.

**EnTech:** EnTech is an initiative taken by E-Cell which envisions to increase the number of technology startup coming out of IIT Bombay. The cell brought 14 business enthusiast professors who are willing to convert their research into business on the board. The cell also created a portal for EnTech which connects the professors with enthusiastic professors.

**Startup Services Platform (SSP):** This initiative aims to provide some of the most necessary services availed by startups at very concessional rates compared to the market rates. The initiative made some major deals with different firms and brought sponsorship as well. A total usage of 24 services by IIT Bombay startups was made this year.

**Illuminate:** Illuminate is a PAN India initiative in which a day-long workshop is organized which caters to the college students and provides them an exposure of starting. Illuminate kit contained a CD made by collecting a lot of information related to entrepreneurship from different sources. This year, 35 workshops were organized under this initiative.

**Envoyage:** Envoyage is a pre-summit workshop organized in Mumbai. There were about 15 free workshops organized this year.

**Enspace:** Two editions of Enspace were launched to motivate the students and keep them updated about alumni and Institute startups. The Enspace blog conceptualized to present current trends in Indian entrepreneurial ecosystem was continuously updated.

#### **Student’s Technical Activity Body (STAB):**

The student technical activities in the Institute saw a huge growth in 2017-18 spearheaded by the move towards technical resource group formation under various clubs. Some of the initiatives of this year were as follows:

- **Aeromodelling Club:** The ornithopter event consisted of an introductory lecture on ornithopters followed by a hands-on

building session. The prototypes were made out of balsa wood and various other materials.

- **Astronomy Club:** A 4-day visit to Udaipur Solar Observatory and Mt. Abu IR observatory along with 35 students was organised. On day one, Professor Nandita and students explained about the working, functioning and other important aspects of the telescope. The visit was followed by a night sky observation session at a camping site located near Mt. Abu. On day two, the group was shown the IR Telescope and the working of the telescope was explained.
- **Biotech Club:** An interdisciplinary biology quiz, involving logic, maths and applications in physics was held. The event demonstrated the interdisciplinary sense of biology and how biology can be something engineers can experience in daily life.
- **Energy Club:** The club conducted an interactive session with two alumni of IIT Bombay Mr. Rushil Desai and Mr. Ayush Mahajan who are working in the energy sector. The alumni talked about their work and about the challenges and opportunities for startups in the Energy sector in India.
- **Electronics and Robotics Club:** Conducted an XLR8 workshop for 45 students from IIT Goa. Total nine teams worked in the XLR8 bot. An hour long



Visit of students from Astronomy Club of IIT Bombay to Udaipur Solar Observatory and Mt. Abu IR observatory





**Mr. Rushil Desai and Mr. Ayush Mahajan, alumni of IIT Bombay at the interactive session organised by the students of Energy Club at IIT Bombay**

session on “How Things Work” on working of stepper motors, relay, cell phone, Playstation Remote was also organised.

- **Maths and Physics Club:** On the birth anniversary of Albert Einstein, the club invited Prof. Shiraz Minwalla, a theoretical physicist known for his pioneering work on string theory and quantum field theory.
- **Web and Coding Club (WnCC):** The club organized the first ever Data Science Day in 2018 to celebrate data science. The celebrations included a series of talks and panel discussion consisting of speakers from both industry and academia. The Data Science Day also consisted of a local-level Women in Data Science (WiDS), conference, panel discussion on “AI and India-today and tomorrow” and student project presentations. The club received guidance from Prof. Kavitha Telikeypalli, Computer Science, TIFR

and Prof. Sunita Sarawagi, Prof. Nutan Limaye, Prof. Preethi Jyothi, Department of Computer Science & Engineering, Prof. Sharayu Moharir, Prof. Amit Sethi, Department of Electrical Engineering, IIT Bombay.

- **Tinkerers’ Lab:** Two major equipments were acquired during the year at the lab. The laser cutting machine has been used very regularly by almost all the technical teams in the institute. The lab team organised a laser cutter machine orientation just after the machine became operational for the students.



**Student participants at the Data Science Day celebrations organised by the Web and Coding Club (WnCC) at the IIT Bombay campus**

- **Inter IIT Tech Meet 2017-18:** IIT Bombay secured a silver and a bronze medal along with finishing a respectable 5th overall, even though the entire contingent comprised first-time participants.



**Participants at the XLR8 Workshop organised by the Electronics and Robotics Club**

# Placement

The formal campus placements involving company interviews for the academic year 2017 was conducted in two phases. Preparations for these phases started in July 2017. The first phase of IIT Bombay's campus placement in December 2017 witnessed participation of more than 246 companies and 1018 job offers including the pre-placement offers. Students from Bachelor of Technology (BTech), Bachelor of Science (BS), Dual Degree (DD – BTech+MTech), Master of Science (MSc), Master of Technology (MTech), Master of Design (MDes), Master of Philosophy (MPhil), Dual Degree (DD – MTech+PhD), Dual Degree (DD - MSc+PhD) 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 1689 students registered for campus placements in 2017-18 which included PhD and MDes students.

Student registration for campus placements opened in August 2017 with the customary introduction to the placement process by the Professor-in-charge and student placement team. Companies were invited July 2017 onwards to fill up the online "Job Announcement Forms" which opened to students registered for placements from late September. Pre-placement talks by some companies provided an avenue for interaction and familiarisation of students with recruiting organisations and their work profiles as a run up to formal placements. The Placement Cell introduced a Career Fair, which gave both the companies as well as the students an opportunity for one-on-one interaction. Companies were asked to make only electronic presentations rather than on-campus talks, especially if they have visited IIT Bombay over the past few years. The company interview process for the first phase began on December 1, 2017.

December 1, 2017, the first day of formal placements, saw 34 companies, representing some of the most coveted jobs in the global industry. An unprecedented 162 students

were placed on that day reconfirming the commitment of top recruiters to IIT Bombay graduates. Placement season 2017 also saw the presence of many more "core" engineering companies on the first day of campus placements. In the year 2017-18, the formal placement process for IDC was conducted separately wherein the first firm came on December 13, 2017.

## Engineering and Technology

IIT Bombay 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. This year, there were 324 job offers by 80 organisations to the students of IIT Bombay. Due to the increasing interest of students in Public Sector Undertakings (PSU), the placement team incorporated new policies to ensure that the best possible placement opportunity is made available to the students well in time. Contrary to the previous years, PSUs were invited prior to commencement of Phase 1 placements, which ensured that the PSUs get the flexibility to run their process in sync with IIT Bombay placements.

## 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 139 job offers from 36 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 IIT Bombay.

## Consulting Sphere

Over 24 leading consulting firms, including several global leaders, visited IIT Bombay for campus placement this year. These organisations work with large corporations across the world and help them resolve complex business problems. Management

Consulting companies carry a reputation of being very selective in their choice of campuses and follow extremely high standards in their recruitment process. Over 101 offers were made in the consulting sector including management consulting.

### 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, the sector noticed a rush among top-level as well as mid-level companies to recruit the brightest and the best from the campus. Twenty seven companies from these sectors offered 127 jobs to students. The rapid ongoing digitization of financial services sector in India also resulted in strong presence of Indian financial firms in a sector traditionally dominated by multinationals at IIT Bombay.

### 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 Bombay saw an increase in the number of organisations hiring fresh graduates in the research and development sector. A total of 24 R&D organisations offered 89 positions this year.

### Education

IIT Bombay continues to provide faculty to several educational institutions through campus placement over the past several years. Over 39 students, including some with doctoral degree, have been offered jobs with 10 public and private educational institutions through campus placement.

### IT/ Software

IIT Bombay students known for their high-levels of programming skills continued to attract recruiters through campus placement over the past several years. Over 177 students, including several with doctoral degree, have been offered jobs with 62 public and private educational institutions through campus placement.

### 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 Fast Moving Consumer Goods (FMCG). Most of these firms are world leaders in their respective domains. We also had some of the major start-ups as recruiters and the start-ups were screened based on the opportunity to make immediate and visible contributions, chance to own equity. This seemed to attract IIT Bombay students to start-ups. Table 1 and Figure 1 describe sector-wise placement details. Overall, 294 organisations have made 1101 offers from various 10 different sectors.

## Student Preparations

To ensure that our students meet up the recruiters' requirements, the placement team has always kept the student preparatory activities at its key focus. Like previous years, the Placement Office organized umpteen activities to enhance the placement preparation of the students. To ensure that the students are well equipped in their areas of interest, we conducted different boot camps, from coding to consulting and from finance to analytics. The boot camps were organized independently as well as in collaboration with the Career Cell, IIT Bombay, to enhance the understanding of students as well as to hone their skill set. 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. This year, the Placement cell introduced Student-Alumni mentorship programme which saw an active participation from alumni as well as students. Assessments and interview preparation for pre-final year and second year students to help them with their internships were also started during the year. To provide an additional opportunity to all students, this year, the placement cell introduced bonus opportunity JAFs which gave the students an edge over the norms to apply to their dream profiles and firms and to showcase their talent. Through this, their candidature are equally valued.

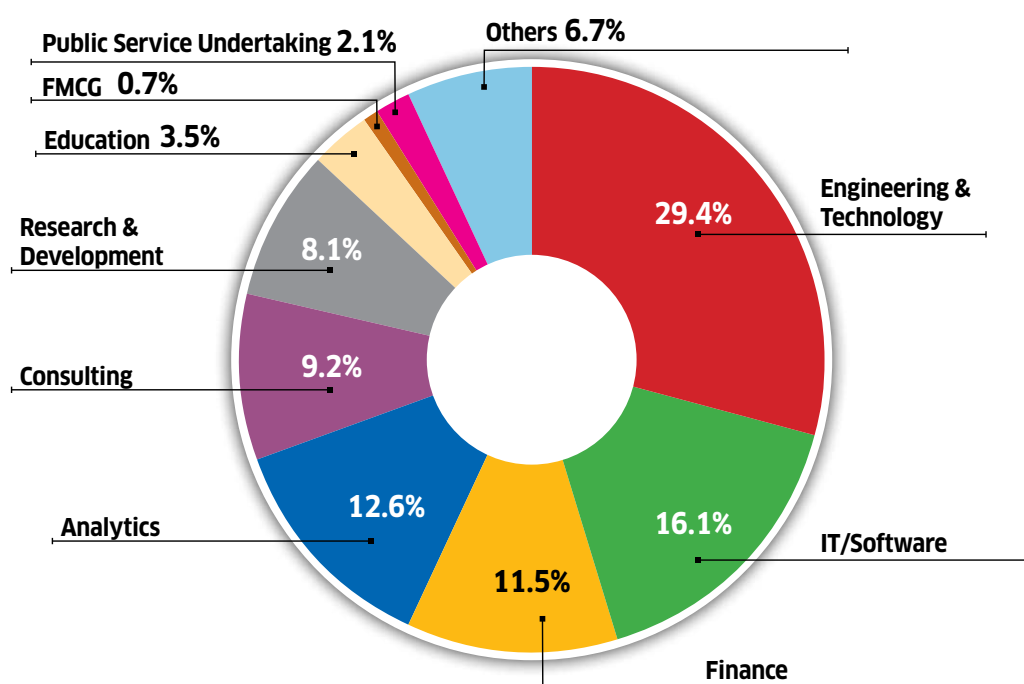
## Conclusion:

The successful campus placement session in 2017-18 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 for the first time, and we look forward to fostering long-term relationship with all these organisations in near future.

**Table 1:** Distribution of offers made in different sectors:

Sr. No.	Sector	Number of Organizations	Number of Offers
1	Engineering & Technology	80	324
2	IT/ Software	62	177
3	Finance	27	127
4	Analytics	36	139
5	Consulting	24	101
6	Research & Development	24	89
7	Education	10	39
8	FMCG	2	8
9	Public Services Undertaking	5	24
10	others	24	73
	<b>Total</b>	<b>294</b>	<b>1101</b>

**Figure 1:** Distributions of offers made in various sectors



## Program-wise statistics:

All registered students do not necessarily participate actively in campus placements. Some eligible students having alternate plans like higher education, research or careers, still register for the campus placement. It is important to note that the students also get placed through channels other than campus placements. The program-wise placement data is provided in Table-2 and Figure-2.

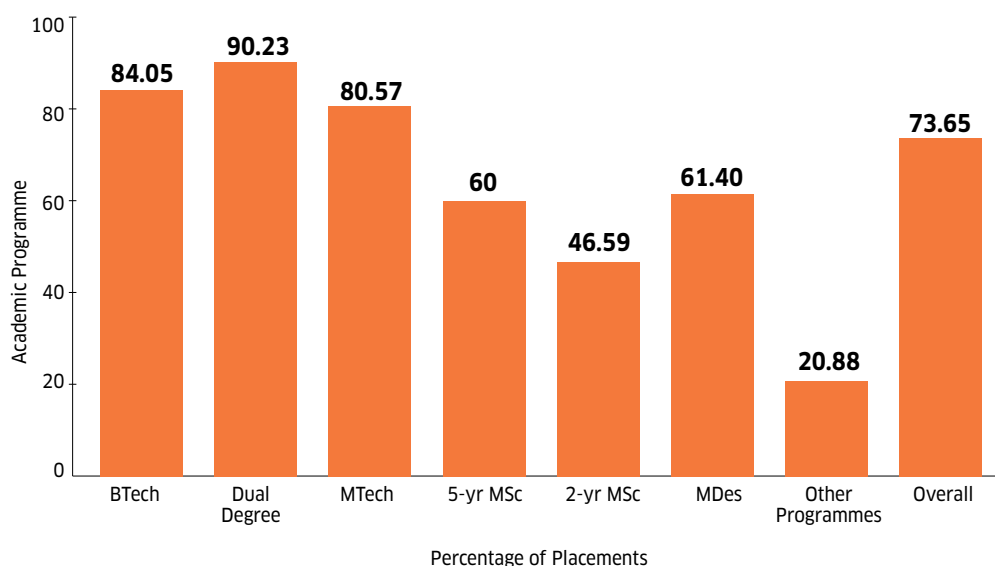
**Table 2:** Program-wise statistics:

Academic Programme	Registered	Participated	Placed	Percent placed
BTech	562	514	432	84.05
Dual Degree (BTech+MTech)	195	174	157	90.23
MTech(2 Yr.)	542	489	394	80.57
5-yr MSc	16	15	9	60.00
2-yr MSc	152	88	41	46.59
MDes	57	57	35	61.40
Other Programmes	165	158	33	20.88
<b>Total</b>	<b>1689</b>	<b>1495</b>	<b>1101</b>	<b>73.65</b>

Includes BS, MPhil, MTech+PhD, MSc+PhD, MSc+MTech, PhD, MS by Research

**NOTE:** Participated count excludes de-registered students who opt for higher studies and have other career options and hence de-register themselves from the placement process.

**Figure 2:** Programme-wise placement (%)





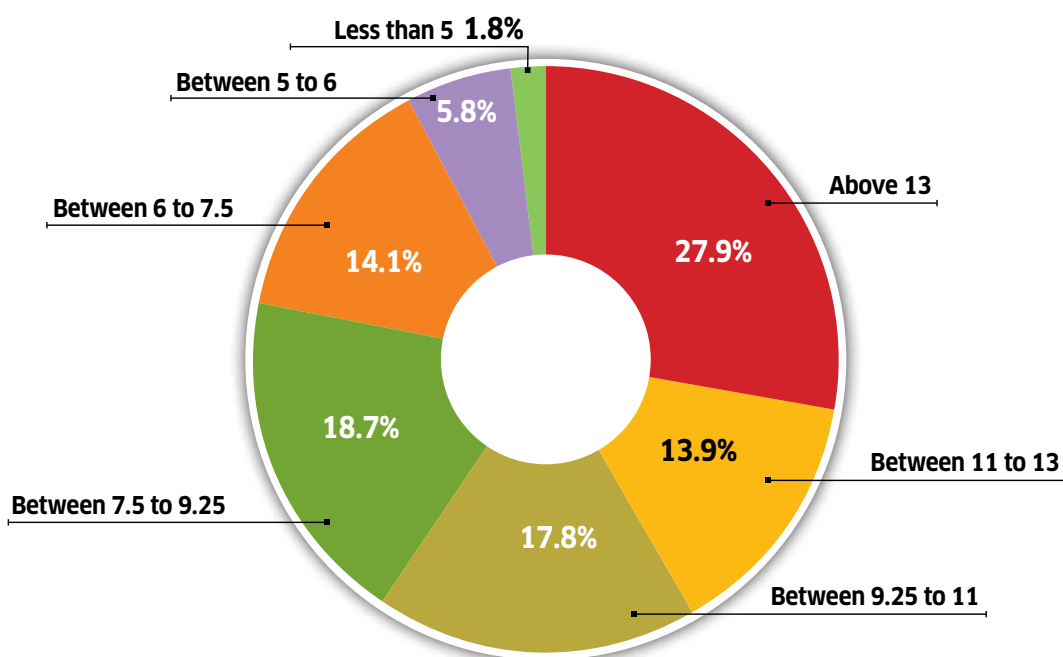
## Salary-wise statistics:

The job opportunities offered by recruiting organisations are divided into various categories based on the gross compensation packages as listed below. Factors other than compensation package like job profile, past association of recruiting organisation, may sometimes be considered to alter the category. This year, most number of firms offered salary above 13 Lakhs Per Annum (LPA). Salary-wise classification of total offers made is shown in Table-3 and Figure-3.

**Table 3:** Placement detail as per salary offered

Range of Gross Salary (in Lakh Rupees per annum)	Number of Organizations	Number of Offers Received
Above 13	72	307
Between 11 to 13	38	153
Between 9.25 to 11	52	196
Between 7.5 to 9.25	56	206
Between 6 to 7.5	45	155
Between 5 to 6	23	64
Less than 5	8	20
<b>Total</b>	<b>294</b>	<b>1101</b>

**Figure 3:** Salary wise classification of total number of offers



### Comparison: Average Salary, International and Pre-Placement Offers:

Average Gross Salary offered was 12.69 Lakhs and CTC offered was 16.25 Lakhs. The total number of Pre-Placement Offers (PPOs) was 100, which was the all-time high. In all, 75 International offers were made this year which includes PPO's. This shows positive trend in the pay package offered by various organisations. (Refer Table-4).

**Table 4:** Year-wise placement comparison

Description	2016-17	2017-18
Average Gross Salary (in LPA)	<b>11.41</b>	<b>12.69</b>
Average CTC (in LPA)	<b>13.38</b>	<b>16.25</b>
Total number of Pre-Placement Offers	<b>59</b>	<b>100</b>
Total number of International Offers	<b>67</b>	<b>75</b>

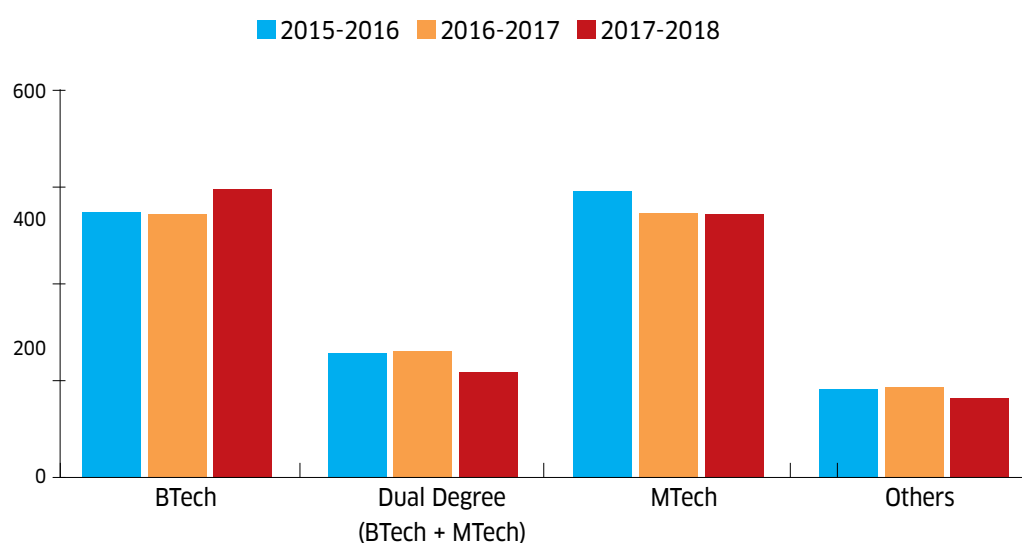
### Year-wise Placement Comparison

Despite the challenging market situations over the years, IIT Bombay managed to maintain good interest amongst the recruiting firms in the IIT students. Table-5 and Figure-4 show the comparison of students placed over the last three years.

**Table 5:** Comparison of students placed in 2015-16 vs 2016-17 vs 2017-18

Program	2015-16	2016-17	2017-18
BTech	397	394	432
Dual Degree (BTech+MTech)	185	189	157
MTech	429	396	394
Others	132	135	118
<b>Total</b>	<b>1143</b>	<b>1114</b>	<b>1101</b>

**Figure 4:** Comparison of students placed in 2015 - 16, 2016-17 vs 2017- 18



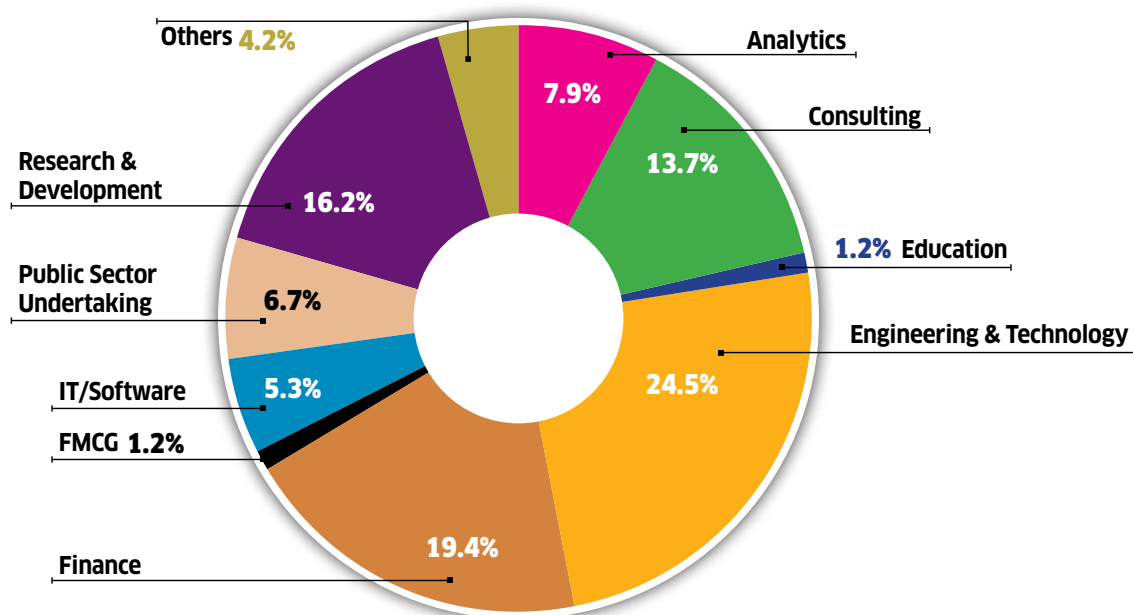
## Sector-wise Statistics for Different Programs

BTech and MTech maintained almost the same demand amongst companies of various sectors. Sectors like Education, and Engineering & Technology showed greater interest in students of IIT Bombay than the previous year. Sector-wise statistics for different degree courses is shown in Table-6 and Figures 5, 6 and 7.

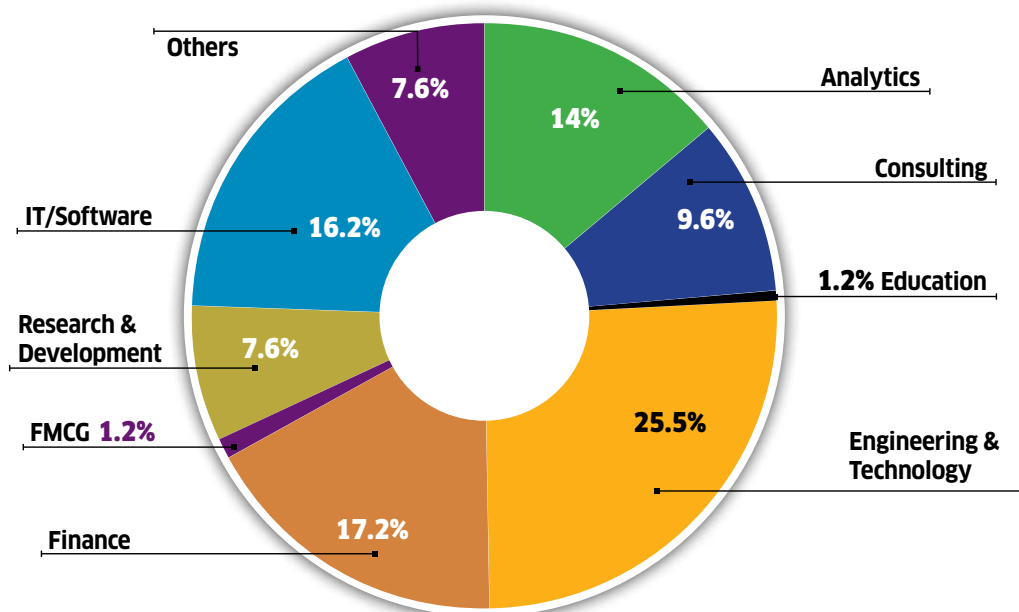
**Table 6:** Sector wise statistics for different degree courses

Sector	BTech	Dual Degree	MTech
Analytics	34	22	53
Consulting	59	15	16
Education	5	1	16
Engineering & Technology	106	40	154
Finance	84	27	12
FMCG	4	2	2
IT/Software	70	26	68
Public Sector Undertaking	23	0	0
Research & Development	29	12	43
Others	18	12	30

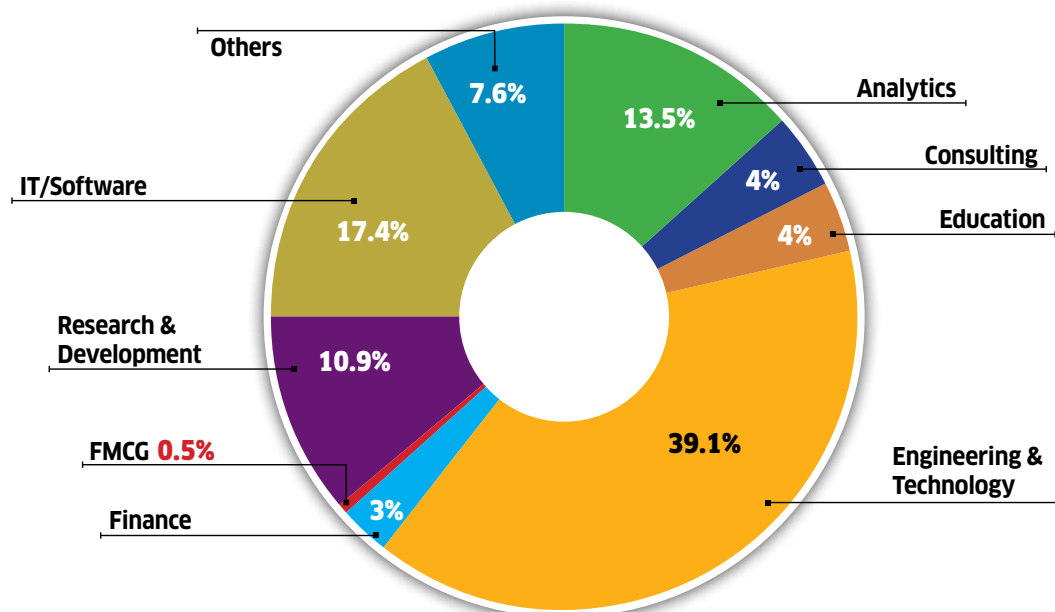
**Figure 5:** Sector-wise selection for BTech



**Figure 6: Sector-wise selection for Dual Degree (BTech + MTech)**



**Figure 7: Sector-wise selection for MTech**



## Internship Report 2017-18:

The Internship Session 2017-18 saw 1075 offers from around 650 organisations. There were 141 Pre-Placement Offers (PPO) made to students for final placement based on their internships in 2016-17, of which 105 were accepted by students.

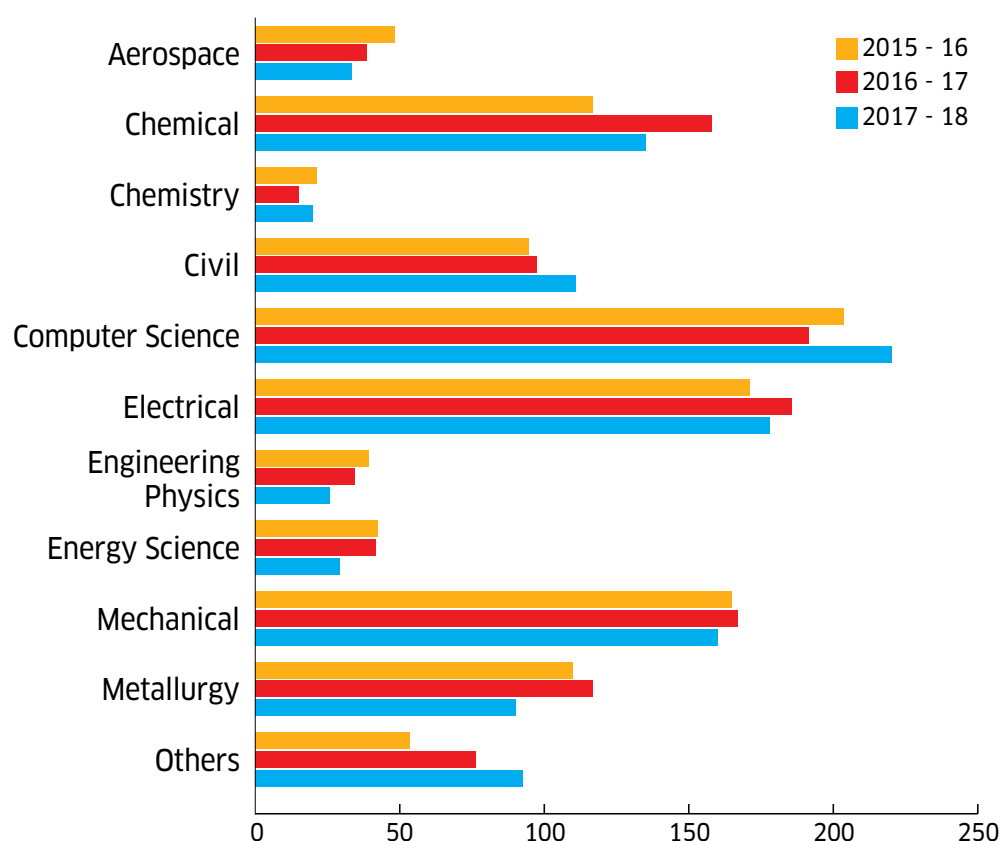
The internship season started in July 2017 and continued till June 30, 2018. The students in the 2nd and 3rd years of Bachelor of Technology (BTech), 4-year of Bachelor of Science (BS), 2-year Master of Science (MSc) and 5-year Dual Degree (DD) programmes in various departments participated in the internship process. Table-7 describes the department-wise internship offers made over the past 3 years.

**Table 7:** Department-wise Internship Data 2015-16, 2016-17, 2017-18 :

Department	2015-16	2016-17	2017-18
Aerospace	48	39	34
Chemical	117	158	131
Chemistry	22	16	21
Civil	95	95	111
Computer Science	201	187	220
Electrical	167	182	176
Engineering Physics	33	30	17
Energy Science	37	39	23
Mechanical	162	164	158
Metallurgy(MEMS)	112	117	88
Others (MSc)	53	77	96

### Department-wise Internship offers:

Students from all departments were in demand by firms and universities alike for internship roles. Most trends which were seen in the previous years, continued this year as well. Though there was a drop in the number of internship for certain departments, the demand for students from departments like Computer Science, Mechanical and Electrical was still high. In addition, the number of MSc internships also increased considerably, keeping in line with the trend observed from the previous year. Figure-8 describes the department-wise Internship offers made over the past 3 years.

**Figure 8:** Department wise intership offers over years



## Summer vs. Winter Internships:

Summer internships start in May and ended in mid-July, whereas winter internships are pursued in the month of December. The number of summer internship is much more than the number of winter internships, which is due to the combinations of the factors such as the students are interested more in summer internship opportunities and also internship are not as easily available in the winters.

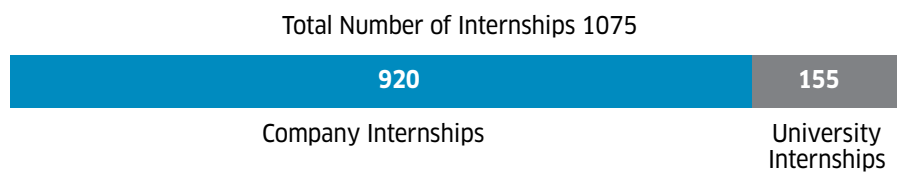
### Summer vs. Winter Internships:



## Companies vs. Universities

This year, the much awaited credit based internship programme was started, by means of which students could leverage the performance in their respective internships towards their academic credit requirements.

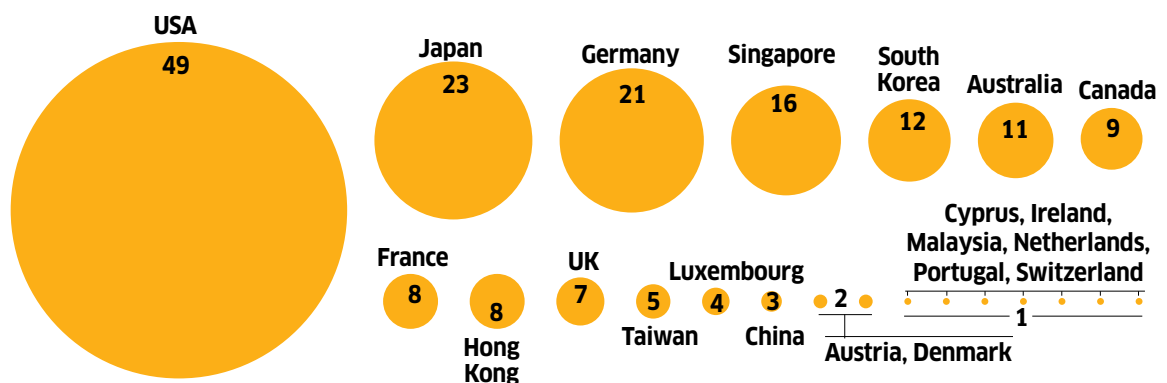
### Companies vs. Universities:



## Country-wise internship offers

The best foreign universities and firms have a huge demand for IIT Bombay students. Table-7 and Figure-9 show the country-wise offers from different foreign firms and universities. Students have received most number of internship opportunities from USA followed by Japan, Germany and other counties in the world.

**Figure 8:** Country wise offers from universities and firms



# Society For Innovation And Entrepreneurship

The Society for Innovation and Entrepreneurship (SINE) is an umbrella for fostering entrepreneurship and nurturing tech start ups 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.

Since its inception, 120 companies have been incubated. In the year 2017-18, SINE hosted 55 companies, of which 17 are new companies that were incubated and 16 graduated. During the period, six companies received VC/Angel investments and 3 companies are based on technology/ knowhow from the Institute. The existing companies are from various technology-sectors such as education, cleantech, mechatronics, IOT, engineering software, fintech, AI/ML, environment, med-tech and healthcare. SINE has also supported around 330 entrepreneurs and 300 innovators under various other programmes, generating more than 3500 employment opportunities.

SINE has been selected as “Centre of Excellence” by Department of Science and Technology (DST), Government of India. The Society for Innovation and Entrepreneurship has also been approved for setting up a BIO-Incubator, i.e., BIO-NEST to support the medtech start ups.

SINE offers start-to-end support to innovators and entrepreneurs. It gives prototyping grants, provides incubation support to IIT Bombay based tech startups and runs accelerator programmes in corporate partnership. Incubation support includes physical infrastructure, seed fund, connections to mentors and investors, professional service providers, exposure to entrepreneurial ecosystem. It runs various events, outreach activities and programs for the benefits of innovators and start-up community. It also conducts several cross border outreach programs.

SINE is closely working with innovators, academia, government departments, industries, other incubators and accelerators, and organizations focusing on innovation and entrepreneurship. Support programmes ongoing at SINE are as follows:

- Prototyping Support program to fund innovators to build their ideas into prototype. Entrepreneurial fellowship program, which supports an aspiring or budding entrepreneur of considerable potential for pursuing a promising technology business idea. These programs serve as a pre-incubation initiative.
- Short term incubation/ accelerator programme in joint collaboration with Intel India to support hardware and system start ups to develop their products and assist in go-to-market strategies and scaling up. This year the focus areas were on start ups with technologies such as Artificial Intelligence-Machine Learning (AI-ML), Blockchain and Internet of Things (IoR) in the domain of Healthcare, Manufacturing, Retails and Transportation.
- Seed Support Program which would provide assistance to start ups and act as a bridge between development and commercialization of innovative products/ services.
- Cross Border Programmes like Academia Industry Training (AIT) - A bilateral entrepreneur exchange program in partnership with Swissnex India, to help them translate their applied research into market applications.

SINE has been recognized as a top-performing university-linked business incubation program at the ‘UBI Awards & Recognition Gala’ at the World Incubation Summit in Toronto, Canada on February 22, 2018 in the Award category of Top Challenger – Asia-Pacific. Companies incubated at SINE are also getting recognised at various platforms and winning several grants and awards. MedPrime Technologies, CareNx Innovations and Bleetech Innovations were awarded the best three start-ups in Maharashtra at the Magnetic Maharashtra Convergence 2018, in Mumbai, an initiative of Maharashtra Government to encourage start-ups in the state.

# 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 42 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:

- Ecole Centrale de Nantes, France
- Sabanci University, Turkey
- Swansea University, UK
- The University of Sydney, Australia
- National Taiwan University, Taiwan
- Clemson University, USA
- Central University of Finance and Economics, China
- Boston College, USA
- Technical University of Denmark (Erasmus + Programme)
- Tarbiat Modares University, Iran
- Czech Technical University in Prague, Czech Republic
- University of Bologna, Italy
- Technische Universität Braunschweig, Germany
- Ocad University, Canada
- Ryerson University, Canada
- Braunschweig University of Technology
- The University of Kitakyushu, Japan
- Pompeu Fabra University, Spain (Erasmus + Programme)
- Technical University of Kosice (Erasmus + Programme)
- Katholieke Universiteit Leuven, Belgium
- KTH Royal Institute of Technology,

Sweden

- Persian Gulf University, Iran
- National Chiao Tung University, Taiwan
- Southern Taiwan University of Science and Technology, Taiwan
- Hokkaido University, Japan
- Indiana University, USA
- Kumamoto University, Japan
- Shamoon College of Engineering, Israel
- Universidad de las Americas, Puebla, Mexico
- Hiroshima University, Japan
- Tel Aviv University, Israel
- University of Baghdad, Iraq
- The University of Newcastle, Australia
- University of Toronto, Canada
- The Abdus Salam International Centre for Theoretical Physics (ICTP), Italy
- Georg Simon Ohm University of Applied Sciences Nuremberg, Germany
- Tohoku University, Japan
- Ecole Normale Supérieure Paris-Saclay, France
- University of Regensburg, Germany
- City University of Hong Kong
- University of Agder, Norway
- University of Moratuwa, Sri Lanka

## Visits of International Delegations

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

- Italian Minister for Economic Development Mr. Ivan Scalfarotto, Dr. Massimo Spadoni – Scientific Attaché, Embassy of Italy in New Delhi, Mr. Vincenzo Antonucci - Consiglio Nazionale delle Ricerche (CNR) - National Research Council of Italy and Ms. Monica Bordegoni - Politecnico di Milano (Technical University of Milan) visited on April 28, 2017.

- Prof. Srihari Krishnaswami, Executive Vice Provost for International Initiatives and Director of Watson Institute for Systems Excellence, Distinguished Professor Bahgat Sammakia, Interim President of SUNY Polytechnic and Professor Mohammad Khasawneh, Chair of Systems Science and Industrial Engineering Department from Binghamton University visited on July 24, 2017.
  - Prof. Gautam Yadama, Dean and Professor at Boston College School of Social Work (BCSSW) visited on August 4, 2017
  - A delegation from University of Adelaide lead by Prof. David Lewis, Chemical Engineering and other members including Prof Anthony Zander, Head of School Mechanical Engineering, Dr Alex Ng, Senior Lecturer, Civil, Environmental and Mining Engineering and Dr Abbas Zeinijahromi, Australian School of Petroleum visited on August 8, 2017.
  - Prof. Robert Allison , Vice Chancellor and President, Prof. Steve Rothberg , Pro Vice Chancellor (Research) and Prof. Stewart Robinson , Dean School of Business and Economics from Loughborough University visited on November 2, 2017
  - Dr. Eric J. Amis, Dean College of Polymer Science and Polymer Engineering and Prof. Sadhan C. Jana, Professor and Chair Department of Polymer Engineering from the University of Akron, USA visited on November 10, 2017.
  - Prof. Keitaro Nakatani, Vice President (Research) and faculty member of Chemistry from École normale supérieure Paris-Saclay visited on November 11, 2017.
  - Prof. Jenny Dixon, Deputy Vice Chancellor for Strategic Engagement from University of Auckland visited on November 21, 2017.
  - Prof. Mau-Chung Frank Chang, President and Prof. Edward Yi Chang, Senior Vice President from National Chiao Tung University (NCTU), Taiwan along with representative from Media Tek Inc visited on December 1, 2017.
  - Chancellor Kumble R. Subbaswamy, Mr. Chris Crooker, Associate Vice Chancellor for Development, Prof. John Klier, Head Chemical Engineering, Prof. Dave Reckhow, Head Mechanical and Civil Engineering, Prof. Om Parkash Dhankher, Stockbridge School of Agriculture, Dr. Kalpen Trivedi, Associate Provost for International Programs from University of Massachusetts, Amherst visited on February 15, 2018.
  - Prof. Joseph Incandela, Vice Chancellor for Research and Prof. Tim Sherwood, Associate Vice Chancellor for Research from UC Santa Barbara visited on February 26, 2018.
  - Vice President Research & International, Dr. Joy Johnson, Prof. Ali Dastmalchian, Dean of Business, Prof. Ian Hand, Executive Director (Venture Labs), Prof. Faisal Beg, Associate Dean Faculty of Applied Sciences and Yusuf Varachia, Director, International Strategic Initiatives from Simon Fraser University, Canada visited on March 7, 2018.
  - Rector of University of Agder, Norway, Prof. Frank Reichert and team visited on March 21, 2018
- In addition, several individuals visited IIT Bombay as representatives of their respective universities.

### **International Students**

A total of 84 International Students (from countries like Bangladesh, Canada, Denmark, Egypt, Ethiopia, Fiji, Finland, France, Gambia, Germany, Hong Kong, Italy, Japan, Nepal, Netherlands, Palestine, Singapore, Sweden, Switzerland, Syria, Taiwan, Tanzania, Thailand, Turkey and USA) have registered at IIT Bombay during the financial year 2017-18. They have joined IIT Bombay 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 the Department of Electrical Engineering, and two dual degree students from the Department of Mechanical Engineering and Department of Metallurgical Engineering & Materials Science respective
2.	City University, Finland	One Dual Degree student from the Department of Energy Sciences & Engineering
3.	Cooper Union, USA	Two Dual Degree students from the Department of Electrical Engineering and Department of Energy Science & Engineering
4.	Ecole Centrale Nantes, France	Two Dual Degree students from the Department of Energy Science & Engineering and two BTech students from the Department of Civil Engineering
5.	ETH Zurich, Switzerland	One Dual Degree students from the Department of Mechanical Engineering
6.	KTH Royal Institute of Technology, Sweden	Two Dual Degree student and one BTech student from the Department of Electrical Engineering and one Dual Degree student from the Department of Mechanical Engineering
7.	Nanyang Technological University, Singapore	Two Dual degree students from the Department of Electrical Engineering and, two BTech students from the Department of Mechanical Engineering and one BTech from the Department of Physics
8.	National Tsing Hua University, Taiwan	One Dual Degree student from the Department of Electrical Engineering
9.	National University of Singapore	One Dual Degree student from the Department of Electrical Engineering, Three BTech students from the Department of Computer Science and Engineering and one BTech student from the Department of Mechanical Engineering
10.	Technical University of Denmark	Four BTech students from the Department of Mechanical Engineering, Three BTech students from the Department of Chemical Engineering, and one Dual degree student from the Department of Energy Science & Engineering

**Foreign Language courses:** Following language courses for the students and staff of IIT Bombay were organised in the Autumn and Spring semesters:-

- French (in association with the Embassy of France, New Delhi)
- Japanese (in association with Koo International Co. Ltd., Japan)
- Italian (in association with University of Pavia, Italy)
- Mandarin (in association with Embassy of Taiwan, New Delhi)





Participants in the joint workshop with the National Chaio Tung University, Taiwan

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

#### **Joint workshop between IIT Bombay - National Chaio Tung University, Taiwan**

IIT Bombay and National Chaio Tung University (NCTU), Taiwan jointly organized a two-day workshop during April 27-28, 2017 at NCTU, Taiwan. The motive of the workshop was to strengthen the academic and research collaborative activities between the faculty members of IIT Bombay and their respective counterparts at NCTU.

Faculty members from the Department of Electrical Engineering and Department of Material Engineering & Materials Science at IIT Bombay, and those from the Electrophysics, Material Engineering and Photonics departments at NCTU gave technical presentations.

During the workshop, at the round table discussion, the NCTU reciprocated positively to IIT Bombay's proposal to initiate dual PhD programs with 1-2 years stay at the partnering foreign university and have also encouraged for more IIT Bombay faculty exchange. The NCTU also conveyed that there is a strong interest among Taiwanese industry in hiring from top Indian institutes and training them at NCTU.

#### **Joint workshop between IIT Bombay – Institute of Materials Research (IMR), Ohio State University**

IIT Bombay jointly with the Institute of Materials Research (IMC), Ohio State University conducted a one-day workshop on Electronic Materials and Applications in Energy at IIT Bombay on December 18, 2017.

Prof. Steve Ringel, Prof. Krishna Sanjay and Mr. Ardeshir Contractor from Ohio and Prof. Rajiv Dusane, Prof. Juzer Vasi, Prof. Shobha Shujla, Prof. Saibal Sarkar, Prof. Amartya Mukhopadhyay, Prof. Dipti Gupta, Prof. Shubhanand Chakravarty and Prof. K.L. Narasimhan from IIT Bombay participated in the workshop. Prof. Iwai from Tokyo Institute of Technology was the special guest on the occasion.

The Director Prof. Devang Khakhar in his welcome address, spoke about the close collaborations between IIT Bombay and IMR, OSU. He also emphasized on the support that IIT Bombay will extend for further collaboration. Prof. Ringel also reiterated the importance of the collaborations between the two Institutes.

The participants at the workshop made presentations on the topic of their research work and possible overlap with their counterparts. The workshop ended with a positive note on future collaborations.

#### **Joint workshop between IIT Bombay – Indo-Korea Science and Technology Center, Bengaluru**

The Indo-Korean workshop on multi-



**Participants in the joint workshop with Indo-Korea Science and Technology Center, Bengaluru**

scale modelling was jointly organized by Indo-Korea Science and Technology (IKST) Center, Bengaluru and IIT Bombay during January 10-12, 2018. The workshop initially had sessions on first principles/ DFT/ Cluster expansion, Atomistic Models (MD/MC), Phase field modelling, crystal plasticity/DD and Modelling across scales and validation. This was followed by theme-based interactive talks delivered by the faculty members of both the Institutes.

The workshop ended on a high note with possible student exchange, faculty exchange and research collaboration. It was agreed upon to have an MoU between the two institutes to facilitate these exchanges.

#### **Joint workshop between IIT Bombay - Technical University Braunschweig, Germany**

The Technical University (TU) Braunschweig is a member of the TU9 – the alliance of leading institutes of technology in Germany and IIT Bombay is a collaborative member in TU9. To strengthen the tie-up further, a one-day joint workshop was hosted on March 5, 2018. The faculty members from various departments from both the institutes gave technical talks on their ongoing research work to identify the areas of common interest for collaboration. The session was followed by lab visits.

The faculty members of the Depart-

ment of Mechanical Engineering from both the Institutes explored the research area on ‘light weight construction and the area of automotive design’.

The workshop ended on a positive note for enhancing future collaboration. The researchers from both ends are committed to work together, identify joint projects and explore external funding.

#### **Joint workshop between IIT Bombay – Deakin University, Australia**

A two-day workshop, jointly with the Deakin University, Australia was held during March 19-20, 2018 at IIT Bombay. The workshop included interactive sessions between the professors of the Department of Metallurgical Engineering and Material Sciences, IIT Bombay and Metal researchers, Deakin University on the current research interests of the faculty members. This was followed by a brainstorming session to identify potential collaboration and the topics for joint supervision between IIT Bombay and Deakin University faculty.

In addition, besides visiting the labs, various ways of engagement and interaction between the institutes were discussed and as a result several identical and complementary strengths were identified for possible joint collaboration.

# 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 government of India, through MHRD, continues to be the primary source of funds for the Institute. The alumni and corporate donations that have picked up significantly in the last few years also provide a great support to the Institute. The Office of Dean ACR performs the important task of nurturing relationship for the benefit of the Institute and raising additional resources from the alumni and other well-wishers of IIT Bombay.

**During 2017-18 the Institute received a total donation of Rs.17.12 crores.** We express our deep gratitude and appreciation for the constant support shown by our alumni and other well-wishers to IIT Bombay. The major donors, among others, were Sir Dorabji Tata Trust, Portescap India Private Limited, CISCO, GE, Applied Materials and Class of 1991, 1992. The development and alumni activities of the Institute are not just a role model in India, but have also been appreciated by major international universities.

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

**Institute Development Fund:** This fund primarily caters to the critical needs of the Institute such as those related to modernization and the establishment of new academic, research and campus infrastructure.

**Young Faculty Awards (YFA):** In an endeavour to enable IIT Bombay 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. The “Young Faculty Joining Bonus”, initially a Class of ’82 Legacy Project, has been awarded from 2010 onwards. The class of 1978, 83, 84, 85 and 88 have also joined this project. Nomura has also contributed to the YFA. The project focuses on supporting young faculty in their academic pursuits in order to attract outstanding young faculty to replace retiring

faculty and to augment current faculty as a key element for IIT Bombay to maintain its long term competitiveness. Numbers of YFA award beneficiaries in the year 2017-18 were 106.

**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. The endowment for a Chair is currently Rs. 90 lakh. The total number of Chair Professors for the year 2017-18 was 73 out of which 47 were Institute Chairs and 26 were Donor named Chairs.

**Hostel Development:** The Hostel Alumni Team Stewardship (HATS) 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 hostel-level reunions in each hostel on the Alumni Day.

The Alumni batch (1964-69) has initiated the project to provide better facilities to the students for their academic progress. As part of this initiative, two air-conditioned study rooms in Hostel 2 and 8 were inaugurated by Prof. Devang Khakhar, Director, IIT Bombay on October 12, 2017 in the presence of Prof. Soumyo Mukherji, Dean (SA), Mr. Arun M. Joshi and Mr. Sitapati S. Koundinya, IIT Bombay alumni, wardens of respective hostels, members of Hostel Affairs Council and respective hostel councils.

## **Student Development:**

**(a) 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 2017-18, about 350 scholarships of varying amounts were granted. Desai Sethi, Yuva Unstoppable and Indira Foundation scholarships are some of the prominent scholarships.

**(b) Awards and Prizes:** As every year, about 50 awards and prizes of varying amounts and forms (certificates, medals, etc.) were given away during 2017-18. The awards in the name of Prof. K.C. Khillar, Mr. R.G. Manudhane, Dr. P.V Sukhatme and Shri Rakesh Mathur, Mrs. Rama Mathur awards are some of the prominent ones given during convocation.

### Major Events:

**(a) Institute Valedictory Function:** The Valedictory Function for the graduating students was organised on April 26, 2017. Prof. Viral Acharya, Deputy Governor, Reserve Bank of India was the Chief Guest on the occasion. The event was graced by the presence of Prof. Devang Khakhar, Director, Prof. Soumyo Mukherjee, Dean (Student Affairs), and Prof. Ravi Sinha, Dean (Alumni and Corporate Relations). The proceedings included the ceremonial transfer of the student list from Prof. Soumyo Mukherjee, Dean (Student Affairs) to the alumni list with Prof. Ravi Sinha, Dean (Alumni and Corporate Relations).

**(b) Student Alumni Meet:** A Student Alumni Meet was organized by the Student's Pan IIT Alumni Relations Cell (SPARC) under the guidance of the Dean (Alumni and Corporate Relations) of four IITs (viz. IIT Bombay, IIT Kharagpur, IIT Madras and IIT Guwahati) on June 25, 2017. The panelists included Mr. Raj Nair, alumnus of IIT Bombay, Chairman, Avalon Consulting and Distinguished Alumnus Awardee; Mr. Ravi Kant, alumnus of IIT Kharagpur, Former Chairman and Managing Director of TATA Motors and Mr. Ambi Parameswaran, Ex. CEO, FCB Ulka and Distinguished Alumnus Awardee. The objective of the meet was to form stronger alumni relations and connect between various IITs on the level of alumni as well as students via cultural exchange and dialogue.

**c) Alumination:** The annual alumni meet, 'Alumination' was organized during October 7-8, 2017. The Alumni Student Mentorship Program (ASMP) has also organized a 'Mentor-mentee meet up' presided by Ms. Shivani Manchanda, Wellness Centre, IIT Bombay, to provide a platform for open discussion about the challenges and solutions of the program.

### d) US Roadshow by IIT Bombay:

A delegation from IIT Bombay visited the USA for annual Roadshow on September 8-18, 2017. The delegation consisted of Prof. Devang Khakhar, Director, Prof. Prasanna Mujumdar, Deputy Director (Finance & External Affairs), Prof. Ravi Sinha, Dean (Alumni & Corporate Relations), Prof. Abhay Karandikar, Dean (Faculty Affairs) and Liza Boffen-Yordanov, ex Chief Development Officer, IIT Bombay Development and Relations Foundation. During the visit, the delegation met several alumni, companies, universities and other well-wishers.

**i) Meetings with University:** During the roadshow, the IIT Bombay team visited the University of California at Berkeley, Stanford University, Columbia University and New York University, Harvard University, and MIT and held meetings to discuss the university leadership, review of MoU, discussions on possible MoUs, interactions with alumni who are faculty members at the university and interactions with research students in order to inform them of faculty recruitments at IIT Bombay.

**ii) Meeting with Companies:** The IIT Bombay delegation participated in meetings with a large number of companies and research organisations during the roadshow. These include nVidia, Global Foundries, CISCO, Ashland and SAP. The discussions identified areas of mutual interest for future collaborations, and also reviewed ongoing collaborations.

**iii) Alumni Chapter Events:** IIT Bombay team attended the Annual Meet of Greater New York alumni chapter during the roadshow. 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. The opportunities that were discussed include interactions/ mentoring students, offering internship opportunities to



students, partnering faculty members in their research activities and delivering expert lectures at IIT Bombay.

**iv) Meetings with Alumni:** Meetings with several distinguished alumni including Bharat Desai, Arun Majumdar and Sanjai Kohli were held during the roadshow. The IIT Bombay team also met the Directors of IIT Bombay Heritage Foundation to discuss the proposed MoU between IIT Bombay and IIT Bombay Heritage Foundation. Meeting with leaders of Greater New York chapter was also held during the roadshow. Some active members of the Silver Jubilee reunion batch (class of 1992) also met the IIT Bombay team to discuss the Silver Jubilee legacy project priorities of the Institute.

**e) Institute Alumni Day and Presentation of Distinguished Service Awards (DSA):** The annual Alumni Day, celebrated on December 24, 2017 (the last Sunday of the year), saw 'Distinguished Service Awards' being conferred on Mr. Milind Mhaiskar (BTech, 1990, Chemical Engineering) and Mr. Sanket Gadia (BTech, 2002, Metallurgical Engineering and Materials Science). The event saw a footfall of more than 400 alumni. During this event, the Class of 1992 presented their 'Silver Jubilee Class Legacy Project' and pledged to contribute a record-breaking amount of Rs. 9.4 crore to the Institute. The Legacy Project will be looking at deploying these funds in a number of projects largely related to student well-being, including scholarship programs for deserving students, upgradation of study facilities across the hostels, supporting the ongoing Institute efforts, student counselling amongst other things.

The class of 1992 celebrated its Silver Jubilee Reunion (SJRJ) of their graduating class from IIT Bombay during December 22-24, 2017. The SJRJ was attended by around 160 alums. Around 10 alumni from the class of 1962 (first graduating batch), who were present during the Alumni Day, celebrated their 55th reunion.

The class of 2007 held their Decennial reunion on December 24, 2017. The batch of 1987 also met for their 30th year reunion.

**f) Foundation Day and Distinguished Alumnus and Young Alumni Achievers Award :**

The 59th Foundation Day of the Institute was celebrated on March 10, 2018. 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 field of work and are below 40 years of age.

**The recipients of the Distinguished Alumnus Award are as follows:**

- Mr. Rameshwar Kumar Maini, BTech, 1967, Civil Engineering
- Mr. Jayant Damodar Patil, BTech, 1978, Mechanical Engineering
- Prof. Subodh G. Mhaisalkar, BTech, 1984, Metallurgical Engineering
- Prof. Praveen Kumar, BTech, 1987, Civil Engineering
- Dr. T.V. Raman, MSc, 1989, Mathematics
- Ms. Shalini Govil Pai, BTech, 1990, Computer Science and Engineering
- Dr. Kishore Seendripu, BTech, 1990, Metallurgical Engineering
- Prof. Geeta Narlikar, MSc, 1992, Chemistry
- Prof. Viral V. Acharya, BTech, 1995, Computer Science & Engineering
- Mr. Nitesh Tiwari, BTech, 1996, Metallurgical Engineering

The recipients of the Young Alumni Achiever Awards are as follows:

- Mr. Vibhore Goyal, Dual Degree, 2005, Electrical
- Mr. Nishant Patni, BTech, 2007, Electrical

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

Indira Foundation Distinguished Lecture was delivered in October 2017 by Prof. Howard Stone from Princeton University, USA on 'Beauty and Surprises in Fluid Mechanics: Nature, Research'.

Prof K.C. Khillar Lecture in Chemical Engineering in memory of Prof. K.C. Khillar was delivered by Prof. Sanjeev Kumar, Department of Chemical Engineering, IISc Bangalore on "Particle Synthesis Mechanisms – Plenty of Room at the Bottom" on May 4, 2017.



# Institute Events



**Chief Guest Hon'ble Chief Minister of Goa Mr. Manohar Parrikar felicitating Prof. N.B. Ballal (recipient of Lifetime Achievement Award) at the 55th Convocation of the Institute**

## 55th Convocation

The 55th Convocation of IIT Bombay was held on August 12, 2017. Hon'ble Chief Minister of Goa Mr. Manohar Parrikar was the Chief Guest and delivered the Convocation Address. During the 55th Convocation ceremony, 2612 students were awarded the degrees. The degree of Doctor of Science (Honoris Causa) was conferred on Dr. Yusuf Hamied, Chairman, CIPLA Limited and the Lifetime Achievement Award 2016-17 was conferred on Prof. N.B. Ballal on the occasion.

## 59th Foundation Day

IIT Bombay celebrated its 59th Foundation

Day on March 10, 2018. Hon'ble Governor of Maharashtra Shri CH Vidyasagar Rao, was the Chief Guest Dr. Anil Kakodkar, former Chairman, Board of Governors and Prof. S.P. Sukhatme, Former Director of IIT Bombay were the Guests of Honour. Prof. Devang Khakhar, Director, IIT Bombay announced the beginning of Institute's Diamond Jubilee year (March 10, 2018 to March 10, 2019) at the function.

On the occasion, the Chief Guest Shri CH Vidyasagar Rao unveiled the plaque for new Guest House Padmavihar. The Chief Guest also released the Institute postal stamp and the Diamond Jubilee logo in the presence

**Unveiling of IIT Bombay Diamond Jubilee logo by the Hon'ble Governor of Maharashtra Shri CH Vidyasagar Rao during the inauguration of Diamond Jubilee Year (From March 2018- March 2019) on the Foundation Day of the Institute on March 10, 2018**



of the Guest of Honour Dr. Kakodkar during the function. The Institute celebrated 59th anniversary on the Foundation Day by honouring its select alumni for their achievements in diverse fields. The Institute honored 10 outstanding alumni this year with the Distinguished Alumnus Awards and two with Young Alumnus Achievers Awards. The 'Prof. S.C. Bhattacharya Award for Excellence in Pure Sciences' was conferred on Prof. Krishna P. Kaliappan, Department of Chemistry. The 'Prof. H.H. Mathur Award for Excellence in Applied Sciences' was conferred on Prof. Amit Agrawal, Department of Mechanical Engineering and Prof. B. Ravi, Department of Mechanical Engineering.

### Teacher's Day

The 59th Teacher's Day was celebrated on September 5, 2017. Dr. Srikumar Banerjee, Chancellor of Homi Bhabha National Institute, BARC, Trombay was the Chief Guest. The "Prof. S.P. Sukhatme Excellence in Teaching Award-2017" and the "Dr. P. K. Patwardhan Technology Development Award-2016" were presented to select faculty members in recognition of their contributions in the field of teaching and research on the occasion.

### International Day of Yoga:

IIT Bombay celebrated the third International Yoga Day on June 21, 2017 at the Institutes Badminton court in the Gymkhana ground. The celebrations included screening of short movie on 'History of Yoga' on June 14, 2017, meditation camp on June 18, 2017 and lecture on 'Importance of Yoga' by Mr. S.D. Bhalekar, Medical Officer, Kaivalyadhama, Lonavala and lecturer at Gordhandas Seksaria College of Yoga & Cultural Syntheses. On June 21, 2017, 108 round of Suryanamaskar were completed by the registered participants who successfully completed the Yogathon Challenge.

**Van Mahotsav 2017** was celebrated on July 1, 2017. Saplings were planted near Building No.15, behind Type H-1 at the hill side, located within IIT Bombay campus.

**56th Interim Convocation:** IIT Bombay awarded degrees to 147 students at its 56th Interim Convocation on February 24, 2018. The function was presided by Mr. Dilip Shanghvi, Chairman of the Board of

Governors, IIT Bombay and Prof. Devang Khakhar, Director, IIT Bombay. The degrees were conferred upon those PhD students who have completed all the requirements during the period from August 2017 to January 2018 and have requested for the degree to be awarded earlier than the 56th Convocation.

**Matribhasha Diwas:** Matribhasha Diwas (Mother Tongue Day) was celebrated on February 22, 2018 to promote the use of mother tongue in the Institute.

### Institute Lectures/ Colloquia

**Prof. Sanjeev Kumar**, Department of Chemical Engineering, IISc Bangalore, spoke on "Particle Synthesis Mechanisms – Plenty of Room at the Bottom", at an Institute Distinguished Lecture (in memory of Prof. K.C. Khilar) on May 4, 2017.

**Dr. S. K. Mishra**, Distinguished Scientist, DRDO, Ministry of Defense, spoke on "India's Achievements in Missile Technology", at an Institute lecture on July 17, 2017.

**Prof. Surajit Sen**, Department of Physics, State University of New York at Buffalo, NY, USA, spoke on "Nonlinear Dynamics in the Real World", at an Institute lecture on July 13, 2017.

**Mr. Raj Nair**, Chairman, Avalon Consulting, India, spoke on "The Future is Here", at an Institute lecture on August 3, 2017.

**Prof. Abhay Deshpande**, Department of Physics and Astronomy at Stony Brook University (SUNY), New York, spoke on "Proton, whence comest thou spin?" - The deep mysteries of the spin structure of the proton and enlightening solutions suggested by the gluon', at an Institute Lecture on September 15, 2017.

**Mr. Anant Goenka**, Executive Director, Indian Express Group, spoke on "Relevance of print media and the challenges ahead", at an Institute Lecture on September 26, 2017. The talk was organized by INSIGHT, IIT Bombay.

**Dr. Yug Mohit Chaudhry**, Senior Advocate High Court of Bombay, spoke on "The Death Penalty: From the perspective of the

Constitution, Police, Courts and Executive”, at an Institute lecture on September 26, 2017.

**Dr. Abhinav Chandrachud**, Advocate Bombay High Court and Author of Republic of Rhetoric: Free Speech and the Constitution of India, spoke on “On the Right to Privacy”, at an Institute lecture on October 28, 2017.

**Prof. Thomas Blom Hansen**, Professor of Anthropology, Stanford University, California, spoke on “How India Works. Caste, Community and Capitalism”, at an Institute Lecture on October 27, 2017.

**Dr. Lalit Kumar Anande**, Chief Medical Officer, Group of TB Hospitals (Mumbai), TB Hospitals Sewri Mumbai, spoke on “May I Help You” - a campaign for “How Not To Be a TB Patient” an Institute Lecture on October 9, 2017.

**Dr. Howard Stone**, Princeton University, spoke on ‘Beauty and Surprises in Fluid Mechanics: Nature, Research and Technology’, at an Indira Foundation Distinguished Lecture on October 30, 2017.

**Retd. Ambassador Suresh K. Goel**, Indian Foreign Service (Retd.), Ministry of External Affairs (MEA) Former Director, General, ICCR, spoke on “UN Reforms: Myth or Reality”, at an Institute Distinguished Lecture on November 3, 2017.

**Prof. Graham MacGregor**, Professor of Cardiovascular Medicine, Wolfson Institute of Preventive Medicine, spoke on “Everyone worth their salt should know this!”, at an Institute Lecture on November 12, 2017.

**Dr. Amit Biswas**, Executive Vice President, Integrated Product Development, Dr. Reddy’s Laboratories, spoke on “Challenges and Opportunities for Chemical Engineers To Sustain the Global Impact of the Indian Pharmaceutical Industry”, at an Institute Distinguished Lecture in memory of Prof. C.V. Seshadri on November 23, 2017.

**Prof. Nobuhiro Tsuji**, Professor, Kyoto University, spoke on “Ways to Fabricate Ultrafine Grained Steels”, at a steel colloquium on December 11, 2017.

**Prof. Kaivan Munshi**, Frank Ramsey Prof

essor of Economics, University of Cambridge, spoke on “Missing Girls” at an Infosys Prize Lecture on January 4, 2018.

**Prof. Arnulf Grubler**, Professor at Yale University, Researcher at IIASA, spoke on “Technological Innovations for Sustainable Development”, at an Institute lecture on January 22, 2018.

**Prof. Rajmohan Gandhi**, a historian and biographer interested in peace and reconciliation, spoke on “Was Gandhi like us, and can we be like him?”, at an Institute lecture on February 9, 2018.

**Dr. Colin Gonsalves**, Senior Advocate, Supreme Court of India and Founder, Human Rights Law Network, spoke on “Recent Human Rights Controversies in the Supreme Court”, at an Institute lecture on January 13, 2018.

**Prof. Santanu Bhattacharya**, Director, Indian Association for the Cultivation of Science, Kolkata, spoke on “Design of Functional Delivery Systems using Nanobiotechnology”, at ‘Professor C.N.R. Rao Lecture Series on Nanoscience and Nanotechnology’ on January 30, 2018.

**Prof. David P. Field**, Washington State University, USA, spoke on “Forensic Analysis of Plastic Strain for Complex Deformation Processes”, at a Steel Colloquium on February 20, 2018.

**Prof. Chennupati Jagdish**, Australian National University Canberra, Australia, spoke on “Semi conductor Nanowires for Optoelectronics and Energy Applications”, at ‘Professor C.N.R. Rao Lecture on Nanoscience and Nanotechnology’ on January 18, 2018.

**Prof. Serge Haroche**, Nobel Laureate in Physics 2012, spoke on “The connection between blue sky research and innovation”, at the Nobel Laureate Lecture on February 3, 2018.

**Prof. K. T. Ramesh**, Decker Professor of Science and Engineering, The Johns Hopkins University, USA, spoke on “Integrated multiscale materials design for extreme environments”, at an Institute lecture on



February 16, 2018.

**Prof. Ajit Kembhavi**, Emeritus Professor and Fellow, Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, spoke on “Space Astronomy in India – Great Collaborative Opportunities for Scientists and Technologists”, at an Institute Colloquium on March 22, 2018.

**Prof. Peter Voorhees**, Frank C. Engelhart Professor of Materials Science and Engineering, Northwestern University, USA, spoke on “Solidification in 4D: From Dendrites to Eutectics”, at an Institute lecture on March 23, 2018.

**Mr. Amitava Bhattacharya**, CEO of NGO banglanatak.com, spoke on “Culture as a tool for Inclusion/Economics of Culture/Road to Peace/Social Entrepreneurship - a Cultural Way Forward”, at an Institute lecture on April 6, 2018

**(Retd.) Ambassador Deepak Bhojwani**, Indian Foreign Service (Retd.) - Ministry of External Affairs (MEA), Former Ambassador – Latin America, Consultant for Latin America and the Caribbean – LATINDIA, spoke on “India and Latin America: The way forward”, at an Institute Distinguished lecture on April 10, 2018.

**Prof. V. Balakrishnan**, Professor Emeritus, IIT Madras, spoke on “Scaling behaviour, scale invariance, and power laws in the natural sciences”, at an Institute Lecture on April 11, 2018.

**Dr. Guruswamy Kumaraswamy**, Polymer Science and Engineering Division, CSIR-National Chemical Laboratory, Pune, spoke on “Controlling the Assembly of Lipid Molecules”, at Prof. K. C. Khilar Memorial Lecture on April 12, 2018.

**Mr. Arun Goyal**, Special Secretary in the Goods and Services Tax (GST) Council, spoke on “Challenges of implementing GST in Indian Federation” at an Institute lecture on April 13, 2018.

## Conferences

### Symposium On Science And Engineering For Sustainable Development

The Department of Chemical Engineering, IIT Bombay and The Ohio State University, USA, jointly organized an annual symposium on July 26, 2017 on “Science and Engineering for Sustainable Development” in collaboration with Techstain Technologies as organizing partner. The theme of the symposium was ‘Sustainability of Earth and Water Resources from Ecological Perspective’. Dr. V. K. Saraswat, member NITI Aayog and former Director General of DRDO, was the chief guest at the symposium.

### INTERACT 2017 Conference

The Human-Computer Interaction Professionals Association of India (HCIPAI) in association with IIT Bombay and UNESCO’s International Federation for Information Processing (IFIP) organized the ‘INTERACT 2017 Conference’ during September 25-29, 2017 in IIT Bombay campus. The theme of INTERACT 2017 - Global Thoughts, Local Designs - was designed to let HCI researchers respond to challenges emerging in the new age of global connectivity, where they often design products for users who are beyond their borders belonging to distinctly different cultures. The conference focused its attention on four areas: India, developing countries, students and research.

### Scipy India 2017

Free and Open Source Software for Education (FOSSEE) organized SciPy India 2017 at IIT Bombay from November 29-30, 2017. The FOSSEE Project promotes the use of the FOSS tools to improve the quality of education and research. SciPy India conference aimed at providing opportunities to spread the use of the Python programming language in the Scientific Computing community in India. The conference objective was to combine education, engineering, and science with computing through the medium of Python. The conference featured a variety of workshops and invited talks.

### International Conference on Information Systems Security (ICISS-2017)

An international conference on Information

Systems Security (ICISS-2017) was held during December 16-20, 2017 at IIT Bombay. International Conference on Information Systems Security (ICISS), held annually in India, provides a forum for disseminating the latest research results in information and systems security. This year's 13th edition of the conference had 6 technical sessions themed around cryptography, privacy, identity, and analysis/attacks on systems. The paper "The Challenge of Aadhaar" bagged this year's best-paper award.

As a part of conference, a one-day advanced workshop on Blockchain Technology was co-ordinated by Prof. R.K. Shyamasundar, Department of Computer Science and Engineering and Prof. N.V Narendra Kumar (IDRBT Hyderabad). The workshop was organised to gather the experts from academia and industry to discuss the state-of-the-art in blockchain technology. 11 short papers were presented along with brief tutorials to glue the papers together.

#### **International Conference "Natural and Artificial Molecular Machines"**

An international conference "Natural and Artificial Molecular Machines" was organized at IIT Bombay during December 18-20, 2017. Prof. Ambarish Kunwar, Department of Biosciences and Bioengineering, IIT Bombay was the convener of the Conference. The conference provided a common platform for discussion and sharing of ideas to researchers, working in the areas of natural and artificial molecular machines. Prof. Steven P. Gross Department of Developmental and Cell Biology School of Biological Sciences University of California, Irvine, CA, USA and Prof. Debashish Chowdhury, Department of Physics, Indian Institute of Technology Kanpur delivered the keynote talks followed by plenary invited speakers.

#### **International Conference On 'Entrepreneurship And Family Business'**

The Shailesh J. Mehta School of Management, IIT Bombay and University of North Texas (UNT), USA jointly organized an International Conference on Entrepreneurship and Family Business (ICEFB) during January 8-10, 2018. The conference was aimed at tackling challenges facing small and medium

enterprises and family firms around the world.

International Conference on Management of Intellectual Property and Strategy (MIPS)  
An international conference on Management of Intellectual Property and Strategy (MIPS) 2018 was held during January 31 to February 3, 2018 and jointly organised with support from DIPP, IPR Chair Project, IIT Bombay and NITIE, Mumbai at IIT Bombay.

#### **Tata Centre For Technology And Design Symposium 2018**

TCTD Symposium 2018 was the first annual conclave hosted by Tata Centre for Technology and Design (TCTD), IIT Bombay during January 17-18, 2018. The theme 'Innovate to Transform' was expected to take on the challenges that academic institutions and stakeholders face in driving social innovation for better impact. This event was planned to showcase the technological solutions, project ideas and research teams from Tata Centre, IIT Bombay, and MIT-Tata Centre, with the objective of collaborating with the relevant stakeholders. The two day-conclave offered a platform for interactions with the faculty members from IIT Bombay and MIT, USA, the Tata Fellows, project team members, the Tata Trusts, governmental agencies, NGOs and impact investors.

#### **Targeted Proteomics Workshop And International Symposium 2018**

Targeted Proteomics Workshop and International Symposium (TPWIS-2018), comprising of series of parallel workshops was conducted from February 24- 28, 2018 at IIT Bombay. Prof. Sanjeeva Srivastava, Department of Biosciences and Bioengineering co-ordinated the event triumphantly.

### **Workshops**

Joint Workshop on Aerosols and Air Quality  
Leading aerosol researchers from the Washington University School of Engineering & Applied Sciences participated in a two-day "Aerosol and Air Quality Workshop" held on June 8-9, 2017 hosted by the IIT Bombay. The workshop was sponsored by MPCB, India. The main objective of the workshop was to bring together a group of researchers from IIT Bombay and Washington University in



St. Louis (WUSTL) with diverse interests and expertise in nucleation, transport, growth, instrumentation, characterization, and multi-scale modeling of aerosols to discuss recent advances, current challenges, and new directions.

### **International Workshop On “Modern Biophysical Tools and Techniques”**

An international workshop on “Modern Biophysical Tools and Techniques” was organized on December 11-15, 2017 by Department of Biosciences and Bioengineering at IIT Bombay. Students and early career researchers who seek an introduction to modern biophysical experimental tools and techniques which are used to study of biological systems ranging from molecular to the cellular levels were main beneficiaries of the workshop. Prof. Ambarish Kunwar, Department of Bio-sciences and Bio-engineering was the convener of workshop. The topics covered in this workshop included fluorescence microscopy, Confocal microscopy, Super-resolution microscopy, Fluorescence Resonance Energy Transfer (FRET), Fluorescence-Activated Cell Sorting (FACS), Optical Tweezers, Bio-AFM, NMR and microfluidics.

### **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 Writing Skill” etc. were conducted during the year for staff members of the institute. The cell continues to send Hindi synonyms of the administrative terms through the Institute’s email (GPO). The Institute’s Newsletter ‘Campus Diary’ is also published in bilingual.

This year 12 staff members of the Institute appeared for Hindi Typing Exam, and 32 staff members appeared for Parangat programme conducted by the Hindi Teaching Scheme, Department of Official Language, Ministry of Home Affairs

“Hindi Pakhawada” was celebrated during September 1-14, 2017, where competitions in story writing, Hindi translation and Singing were organised for the staff members and poetry recitation competition was organised for students of the Institute. A one-day Hindi Pustak Charcha on ‘Rashmi Rathi’ and a five-day Hindi Book Exhibition was jointly organised by the Central Library and Hindi Cell on the occasion. Prof. Ravindra Katyayan, Head of the Department of Hindi, Maniben Nanavati Women’s College was the Chief Guest of the Hindi Diwas. The certificates and cash awards were distributed to the winners of the competition.

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.

# Departments/ Centres/ Schools and Interdisciplinary Groups

## Science & Engineering Departments:

The engineering departments at IIT Bombay offer undergraduate and postgraduate programmes leading to BTech, MTech or PhD degrees. The five-year Dual Degree programme pioneered by the Institute in 1996, offers a BTech degree in a basic discipline and an MTech 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. Following are the Science and Engineering Departments at IIT Bombay:

- 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 Material Sciences
- Physics

## Arts and Humanities Department:

The Arts and Humanities Department at IIT Bombay were set up to familiarize 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, MPhil, MDes, and PhD.

- Humanities and Social Sciences

## Schools:

- Shailesh J. Mehta School of Management (SJMSoM): 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.
- IDC School of Design: The school 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.

## Centre/ Interdisciplinary Groups:

Some of 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. Following are the Centres at IIT Bombay:

- 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 Nanotechnology and Science
- Education Technology
- Industrial Engineering and Operations Researchers
- Systems and Control Engineering
- Corrosion Science and Engineering
- Climate Change Studies

### Other Centres/ Research Facilities:

Other Centres host a large number of sophisticated equipments and advanced facilities for carrying out R&D activities at IIT Bombay. Following are the research facilities at IIT Bombay:

- Centre for Policy Studies
- Application Software Centre
- Center for Aerospace Systems Design & Engineering
- Computer Centre
- Centre for Distance Engineering Education Programme
- Desai Sethi Centre for Entrepreneurship
- IITB-Monash Research Academy
- National Centre for Aerospace Innovation and Research
- National Centre for Mathematics
- Tata Centre for Technology and Design
- Wadhvani Research Centre for Bioengineering
- Centre of Excellence in Steel Technology
- Centre of Propulsion Technology
- Biomedical Engineering and Technology Incubation Centre
- Centre for Computational Engineering and Science
- Centre of Excellence in Nanotechnology
- Forbes Marshall Energy Efficiency Laboratory
- Geospatial Information Science and Engineering
- National Centre for Photovoltaic Research and Education
- National Centre of Excellence in Technology for Internal Security
- National Mission on Education through ICT
- National Solar Thermal Research, Testing & Simulation Facility
- Tata Teleservices - IIT Bombay Centre of Excellence in Telecommunication

### Aerospace Engineering

Established in 1966-67 as the Department of Aeronautical Engineering, the Department was renamed the Department of Aerospace Engineering in 1992. The department has a total of 24 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. The Department has extensive experimental and computational facilities that support its research and teaching activities. Among these are: the Aerodynamics Lab, which houses wind and shock tunnels, Laser Doppler Velocity-meter (LDV), Anechoic Chamber for noise measurement; the Instrumentation Lab.; the Structures Lab; the Propulsion Lab; and the MAV Lab.

**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 BTech degree program, the five year Dual Degree program, the two year MTech program and the PhD program. The department has around 350 students, out of which about 120 are graduate student and 230 are undergraduate students.

	Student Intake	Degrees Awarded
BTech	62	46
MTech	47	37
DD(BTech-MTech)	-	18
PhD	16	6

**R&D Activities:** During the year 2017-18, 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 in the department, following were the publications during the year:

	Sponsored Projects	Consultancy Projects
New Projects	13	9
Ongoing	22	9
Completed	5	1

During the year 2017-18, the department has supported many student technical activities such as Mars Rover, Student Satellite, Autonomous Underwater Vehicle (AUV) Unmanned Air Vehicle 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 2017-18 are:**

- **Commissioning of Lab-Scale Autoclave:** Lab-scale autoclave was commissioned in the Structures Laboratory of the department. It has a working space of 900 mm diameter and 1000 mm length. This has a maximum working temperature of 200 degrees Celsius and can sustain pressure upto 7 bar (g). It is capable of being operated under auto, semi-auto and manual modes. Additionally, it has user friendly Mimic and Touch screen based data acquisition. The facility can be used in the curing process of aerospace grade composite materials and structures.
- **Cardiovascular Flow Laboratory:** The department has recently added the Cardiovascular flow setup to its Aerodynamics Laboratory. Currently, investigations are underway with focus on two problems. First, to improve the FONTAN circulation in TCPC patients who have been operated upon for Congenital Heart Defect – born with a single ventricle. Second, to study the effect of orientation of bi-leaflet valves on flow patterns in Left Ventricle model during diastole while filling through Mitral valve and in Aorta during systole through aortic valve. A working model of the Left Heart which has been indigenously constructed in the Cardiovascular Flows Laboratory for PIV measurements.
- **Long Distance Wireless Communication for Rural Connectivity using Tethered Aerostat:** The objective of this system developed in the department is to provide long distance wireless communication (mobile communication) for rural connectivity and during disaster management. This system is designed to lift a Radio frequency (RF) antenna and cable ~ 65 m above ground level, to provide 2G, 3G and 4G communication in areas located nearby. This platform can also be used for real-time monitoring, aerial surveillance, disaster management, border and costal security, battle damage assessment, area protection and situational awareness, counter terror operations, product promotion and advertisement.



**Working model (left heart) developed in the Cardiovascular Flow Laboratory**



**Lab-Scale Autoclave at Structures Lab**



**Tethered Aerostat (field trials)**

## 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 MSc Biotechnology program, MTech in Biomedical Engineering program, and the PhD program. All these programs are well regarded nation-wide. The department has introduced a new introductory Biology course (BB101) for all first year undergraduate students.

	Student Intake	Degrees Awarded
MSc	24	22
DD(MSc+PhD)	-	03
MTech	29	25
DD(MTech+PhD)	-	02
MPhil	-	03
PhD	37	20

**R&D Activities:** Research in the department encompasses both basic biology and applied bioengineering topics.

	Sponsored Projects	Consultancy Projects
New Projects	33	3
Ongoing	77	5
Completed	29	0

Several new cutting edge facilities were added over 2017-18, such as Ultracentrifuge, High-end Inverted Fluorescent Microscope and Orbitrap Fusion LCMS, to name a few.

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

## Department of Chemical Engineering

The terms of number of faculty members, students enrolled and research funding received. Currently, the department has in its roll 39 core faculty, 10 Emeritus Fellow/ Professor Emeritus/ adjunct/visiting faculty and 12 Post-doctoral fellows/ research associates.

With the support of Tata Trusts, the Tata Centre for Technology and Design has been established with an aim to develop solutions to challenges faced by resource-constrained communities within India and across the world using an end-to-end innovation approach.

**Academic Programmes:** The academic programmes offered by the department are the BTech (4-years), MTech (2-years), Dual Degree (5-year) and PhD programme (~5-year). The department has a total of 796 students (496 BTech/ Dual Degree, 83 MTech and 217 PhD students), 29 supporting staff and ~150 research assistants.

	Student Intake	Degrees Awarded
BTech	120	98
DD(BTech+MTech)	-	24
MTech	63	18
PhD	56	23



The Department has seen a steady increase in the strength of doctoral students resulting in a vibrant research culture. This reflected an increase in the output of research publications of the department (3.4 journal articles per faculty per year).

**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. It also, has a strong focus in the subjects relating to Healthcare, Energy and Materials.

	Sponsored Projects	Consultancy Projects
<b>New Projects</b>	<b>14</b>	<b>29</b>
<b>Ongoing</b>	<b>72</b>	<b>34</b>
<b>Completed</b>	<b>26</b>	<b>15</b>

During 2017-18, the department received research grant from government and private agencies to the tune of Rs. 24.8 crore with ~42 new sponsored 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. Today the department has 39 faculty members with expertise in various areas of chemistry. The department organized Asia-Pacific Conference of Theoretical and Computational Chemistry, USA-IITB Satellite Conference on Chemical Synthesis and NTU-IITB joint mini symposium during 2017-18.

**Academic Programmes:** The department offers Masters in Chemistry (2-years), BS in Chemistry (4-years), Integrated MSc-PhD and PhD program. The General Chemistry program of the department, consisting of two theory and two laboratory courses in the core curriculum of the first year BTech. The department also offers an additional course to third year BTech/Dual Degree MTech (Chemical Engineering) students.

	Student Intake	Degrees Awarded
<b>MSc (5-year)</b>	<b>30</b>	<b>22</b>
<b>MSc (2-year)</b>	<b>43</b>	<b>40</b>
<b>DD(MSc+PhD)</b>	<b>-</b>	<b>1</b>
<b>MPhil</b>	<b>-</b>	<b>1</b>
<b>PhD</b>	<b>55</b>	<b>37</b>

**R&D Activities:** The Department of Chemistry is involved in research of basic, applied and interdisciplinary nature in frontier areas through sponsored and industrial research projects. Major areas of research activities carried in the department include Biophysical Chemistry, Coordination Chemistry, Bio-inorganic Chemistry, Organometallic Chemistry, Bio-organic Chemistry, Chemical Biology, Theoretical Systems Biology, Membrane Biology, Chemistry of Natural Products, Synthetic Organic Chemistry, Photochemistry and Spectroscopy, Polymer Chemistry, Thermodynamics, Electrochemistry, Solid State Chemistry and Physics, and Catalysis and Theoretical Chemistry.

	Sponsored Projects	Consultancy Projects
<b>New Projects</b>	<b>27</b>	<b>11</b>
<b>Ongoing</b>	<b>73</b>	<b>13</b>
<b>Completed</b>	<b>34</b>	<b>5</b>

During 2017-18, several eminent personalities visited the department and gave lecture. Prof. Rajan Sankaranarayanan, CSIR-Centre for Cellular and Molecular Biology, Hyderabad, gave Professor A.K. Lala Memorial Lecture on September 13, 2017 and Prof. S. Chandrasekaran, IISc., Bangalore, gave Professor K.D. Deodhar Memorial Lecture on April 10, 2017.

## 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 undergraduate and postgraduate 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. The department has 50 full-time, five adjunct and two visiting faculty members.

**Academic Programmes:** Department is running MTech and PhD programmes with its traditional BTech programme in Civil Engineering. The department has re-started MTech programme in Remote Sensing.

	Student Intake	Degrees Awarded
<b>BTech</b>	<b>120</b>	<b>98</b>
<b>DD(BTech+MTech)</b>	<b>-</b>	<b>24</b>
<b>MTech</b>	<b>63</b>	<b>18</b>
<b>PhD</b>	<b>52</b>	<b>23</b>

**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
<b>New Projects</b>	<b>23</b>	<b>445</b>
<b>Ongoing</b>	<b>66</b>	<b>383</b>
<b>Completed</b>	<b>15</b>	<b>218</b>

The department has also conducted 10 quality improvement and continuing education programmes during 2017-18.

## Computer Science and Engineering

The Department of Computer Science and Engineering (CSE) at IIT Bombay is the largest among CSE departments in any Institute in India. The department has 45 faculty members, including two visiting and one adjunct faculty.

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

	Student Intake	Degrees Awarded
<b>BTech</b>	<b>122</b>	<b>99</b>
<b>MTech</b>	<b>102</b>	<b>101</b>
<b>Phd</b>	<b>14</b>	<b>06</b>

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

	Sponsored Projects	Consultancy Projects
<b>New Projects</b>	<b>28</b>	<b>16</b>
<b>Ongoing</b>	<b>71</b>	<b>16</b>
<b>Completed</b>	<b>32</b>	<b>10</b>

## 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 MSc programme in Applied Geology was offered since 1964). The Department draws strength from the reputation of its 23 faculty members with specializations covering a wide spectrum of research areas in Geosciences including both Geology and Geophysics. The faculty members of the department are actively engaged in both teaching and research and contribute significantly towards advancement of different Geoscience disciplines. 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 has 23 core faculty members, 58 research scholars, 5 post doctoral fellows, and 23 supporting staff members.

The department boasts of state-of-the-art laboratories and research facilities including three major national facilities – 40Ar/ 39Ar Mass Spectrometer for Geochronology, Electron Probe Micro Analyzer (EPMA) for Mineral Chemistry, and Imaging Spectroscopy and Applications.

**Academic Programme:** The Department offers academic programmes leading to MSc (Applied Geology), MSc (Applied Geophysics), MTech (Geo-exploration), Mtech (Petroleum Geoscience) and Doctoral Degree programs. An MSc - PhD dual degree programme is also offered in Geology and Geophysics respectively. All the core and elective courses included in the Geoscience programs have been specifically designed to meet industry standards and research requirements.

	Student Intake	Degrees Awarded
<b>MSc (2-year)</b>	<b>46</b>	<b>42</b>
<b>MTech</b>	<b>27</b>	<b>19</b>
<b>PhD</b>	<b>26</b>	<b>12</b>

**R&D Activities:** The research area spans but not limited to Deccan basalt petrochemistry and palaeomagnetism, sedimentology, Vindhyan Basin evolution, microbial signature in siliciclastic sediments and recent sediment analysis, petroleum geology, electrofacies interpretations, neural network modelling, evolution of Tapi Basin, mathematical modelling of ore deposits, remote sensing applications in mineral exploration and geomorphology, micropalaeontology, microfacies analysis, fluid inclusion studies, sulphide petrology, engineering geology, hydrogeology, hydrogeochemistry, earthquake seismology, structural analysis and neo-tectonics, petrophysics, satellite geomagnetism and remote sensing. The research and teaching in the department also include natural history, crustal evolution, hydrocarbon and mineral exploration and solid earth geophysics.

	Sponsored Projects	Consultancy Projects
<b>New Projects</b>	<b>9</b>	<b>55</b>
<b>Ongoing</b>	<b>28</b>	<b>36</b>
<b>Completed</b>	<b>8</b>	<b>27</b>

Sponsored research projects, both in pure and applied geology and geophysics, were carried out in the department. The department has published 105 research papers.

## 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 68 faculty members and 1300 students.

**Academic Programme:** Initially the department began with three programs to award degrees, namely, Bachelor of Technology (BTech), Master of Technology (MTech), and Doctor of Philosophy (PhD). 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 dual degree (MTech + PhD) program. This program is designed to induct bright students who have completed their BE/BTech/MSc degrees directly to the doctoral program. Total student strength at present is 1300 (including UG and PG).

	Student Intake	Degrees Awarded
<b>BTech</b>	<b>60</b>	<b>70</b>
<b>MTech</b>	<b>122</b>	<b>107</b>
<b>DD(BTech + MTech)</b>	<b>64</b>	<b>64</b>
<b>PhD</b>	<b>55</b>	<b>23</b>
<b>DD(MTech+PhD)</b>	<b>-</b>	<b>4</b>

**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 the department students who face problems in academics.

	Sponsored Projects	Consultancy Projects
New Projects	45	15
Ongoing	136	31
Completed	22	5

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. The centres that have been setup in the department include Centre for Excellence in Nanoelectronics funded by the Ministry of Communications and IT, National Centre for Photovoltaic Research set up in 2010 (by MNRE), Tata Teleservices IIT Bombay Center of Excellence in Telecom setup in 2008, Bharti Center for Communications, Power Anser Lab (with support from TCS), and Power Electronics Simulation Centre.

## 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 group 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. The ongoing research in the department focuses on providing innovative energy technologies and systems for a sustainable future. Currently the department has 24 core faculty and about 30 associate faculty members from other Departments and about 400 students.

**Academic Programmes:** The department offers Dual-Degree BTech-MTech programme (intake through JEE), Dual-Degree MSc-PhD programme (intake through JAM), MTech programme in Energy Systems Engineering, the PhD programme, and a Minor programme in Energy Engineering.

	Student Intake	Degrees Awarded
DD(BTech + MTech)	30	50(25)
BTech	-	2
MTech	25	24
DD(MSc+ PhD)	11	10(5)
DD(MTech+PhD)	-	2(1)
MSc	-	3
PhD	27	12
PGDIIT	-	1

\* For the dual degree programmes, the bracket shows the number of graduated.

**R&D Activities:** The Department's research areas included renewables (Solar PV and thermal, wind, and biomass) thermal and electrochemical storage systems, power systems and power electronics, energy integrated and energy efficiency, and nuclear energy.

	Sponsored Projects	Consultancy Projects
New Projects	8	5
Ongoing	30	4
Completed	6	2



Some of the major ongoing projects are the National Centre for Photovoltaic Research and Education (NCPRE), the Indo-UK Clean Energy Research Centre, Intelligent Microgrids and Advanced Storage (IMASE), IMPRINT projects on fuel cells and hydrogen storage, and 24x7 Solar Thermal Power (sponsored by NTPC). The 'Million Solar Urja Lamps' was completed and expanded to a target of 7 Million lamps. This project has successfully demonstrated local assembly including using women self-help groups in rural areas.

The 6th edition of the International Conference on Advances in Energy Research (ICAER) was organized by the department during December 12-14, 2017. The conference was inaugurated by the Minister of Petroleum and Natural Gas and had 15 invited speakers, about 260 papers in oral and poster sessions and around 400 participants. Concurrent workshops on hydrogen storage, intelligent microgrid with appropriate storage for energy, and scientific writing (Springer) were organized. A special session on Energy Education involving leading academics from India and South-Asia focused on the challenges facing the energy sector.

The department organized the 17th edition of Energy Day on April 7, 2018. The event had final year students presenting their research work to the participants from the industry, academia, and the society at large. There were around 60 flash presentations and a poster session with a total audience of about 200.

## 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 [MSc (MA)] and the other in Applied Statistics and Informatics [MSc (ASI)], and also a PhD programme. There are minor programmes for undergraduates offered in both Mathematics and Statistics, in addition to the core undergraduate curriculum.

	Student Intake	Degrees Awarded
<b>MSc (MA)</b>	<b>30</b>	<b>28</b>
<b>MSc (ASI)</b>	<b>37</b>	<b>32</b>
<b>PhD</b>	<b>20</b>	<b>12</b>

**R&D Activities:** The research pursued in the department includes a wide spectrum of interest in both Mathematics and Statistics. The department conducts basic, applied and interdisciplinary research in varied areas of Mathematics including Algebra and Number Theory, Analysis, Geometry and Topology, Combinatorics and Theoretical Computer Science, Partial Differential Equations and Numerical Analysis, and Probability and Statistics. Continuing with its tradition, the department has further augmented its basic research, focusing in contemporary areas of fundamental, developmental and strategic importance as well as applied and interdisciplinary research. It is also engaged in a productive collaboration with industries and reputed R&D departments in India and abroad.

	Sponsored Projects	Consultancy Projects
<b>New Projects</b>	<b>5</b>	-
<b>Ongoing</b>	<b>15</b>	-
<b>Completed</b>	<b>8</b>	-

## Department of Mechanical Engineering

The Department of Mechanical Engineering is by far the largest department at IIT Bombay. It has 54 full-time, four Emeritus Fellows and two adjunct faculty members involved in teaching and research and more than 1400 students along with more than 300 enrolled PhD students.

**Academic Programme:** The department offers, besides the flagship BTech program in Mechanical Engineering, MTech and PhD programs. The MTech programs offer specializations in Thermal & Fluids Sciences, Design Engineering, and Manufacturing Engineering. The department has introduced new elective courses; these include Introduction to Microsystems Packaging, Engineering Data Mining and Applications, Introduction to Biofluid Mechanics, Mechanisms in Crystal Plasticity.

	Student Intake	Degrees Awarded
<b>BTech</b>	<b>126</b>	<b>120</b>
<b>DD (BTech + MTech)</b>	<b>24</b>	<b>43</b>
<b>MTech</b>	<b>105</b>	<b>69</b>
<b>PhD</b>	<b>41</b>	<b>33</b>

**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.

	Sponsored Projects	Consultancy Projects
<b>New Projects</b>	<b>34</b>	<b>27</b>
<b>Ongoing</b>	<b>91</b>	<b>36</b>
<b>Completed</b>	<b>25</b>	<b>8</b>

The department also offers an industry-sponsored MTech 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), and Thermal Hydraulics Test Facility. The department with Aerospace engineering has also setup a one-of-a-kind center 'Center of Propulsion Technology (CoPT).

## Department of Metallurgical Engineering & Materials Science

The Department of Metallurgical Engineering and Materials Science continues to excel in a wide variety of areas, ranging from classical metallurgy to non-metallic materials in various forms and dimensional scales for applications ranging from advanced structural components to electronic, optical, sensing, health-care and energy harvesting/ conversion/ storage devices. The department has also been active in providing platforms for exchange of research and technological ideas/ advancements among different researchers and industry personnel, not only from across the country, but also from across the world, in terms of organizing conferences/ workshops/ symposium; in addition to lectures/ seminars in different areas. The Centre for Excellence in Steel Technology, funded by the Ministry of Steel (CoEST), has been organizing the 'steel colloquium' nearly once every two months.

Four faculty members from the department received research and teaching awards for their outstanding research and teaching contributions.

**Academic Programme:** The department offers four-year BTech, five-year Dual Degree (BTech + MTech), MTech, and PhD program. The curriculum for these programs has been developed keeping in view the present technological status and future needs. It provides a strong background in conventional materials like ferrous and non-ferrous alloys as well as advanced materials like electronic materials, ceramics, composites and polymers. The dual degree program with specializations in Metallurgical Process Engineering and, Ceramics and Composites is the first of its kind in the country. The MTech program offers specializations in the areas of Process Metallurgy, Materials Science and Engineering, Steel Technology and Corrosion Science.

	Student Intake	Degrees Awarded
<b>BTech</b>	<b>98</b>	<b>57</b>
<b>DD (BTech + MTech)</b>	<b>26</b>	<b>43</b>
<b>MTech</b>	<b>71</b>	<b>56</b>
<b>PGDIIT</b>	<b>-</b>	<b>02</b>
<b>Dual PhD</b>	<b>-</b>	<b>01</b>
<b>PhD</b>	<b>39</b>	<b>21</b>

**R&D Activities:** 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

	Sponsored Projects	Consultancy Projects
<b>New Projects</b>	<b>27</b>	<b>68</b>
<b>Ongoing</b>	<b>55</b>	<b>63</b>
<b>Completed</b>	<b>20</b>	<b>31</b>

## Department of Physics

The Department of Physics started in June 1958. It has a tradition of vibrant teaching and offers many research programmes. The department has 43 faculty members on its roll.

**Academic Programmes:** The department offers four-year BTech in Engineering Physics, two-year MSc degree in Physics as well as a PhD program. Keeping in line with the national science initiative on nanomaterials and nanotechnology, the department started a five-year dual degree programme leading to BTech and MTech 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 MSc in Physics and MTech in Material Science.

	Student Intake	Degrees Awarded
<b>BTech</b>	<b>41</b>	<b>26</b>
<b>DD (BTech + MTech)</b>	<b>-</b>	<b>10</b>
<b>MSc</b>	<b>43</b>	<b>28</b>
<b>DD (MSc + MTech)</b>	<b>-</b>	<b>4</b>
<b>PhD</b>	<b>31</b>	<b>25</b>

**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	17	-
Ongoing	29	-
Completed	10	-

In addition to the ongoing collaborations with leading research institutions/ universities from India and abroad, several new collaborations were initiated during 2017-18.

## 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 and Sociology. Its faculty offers a wide spectrum of courses at the BTech, MTech, MPhil 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, it has also provided avenues for new research areas for PhD students seeking admission into the department.

**Academic Programme:** Since 1973, the department has been offering doctoral programme in all its disciplines with emphasis on inter-disciplinary topics. In 1993 the department launched a four-semester interdisciplinary MPhil programme in Planning and Development. Facilities of the department include a library, computer laboratory, a psychology laboratory and language laboratory.

	Student Intake	Degrees Awarded
MPhil	26	20
PhD	42	11
BS(Economics)	26	-

**R&D Activities:** The department faculty are involved in a number of research projects independently, in collaboration with faculty members from other departments of IIT Bombay, 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	6	2
Ongoing	11	4
Completed	3	-

**During the year 2017-18, the department has organised following national and international workshops and seminars :**

- Conference on 'Performance Making and the Archive' and 'Philosophy and Everydayness'.
- International conference on 'Framing Another politics: Non-normative sexualities and the South Asian rhetoric'.

- International seminar jointly organized by the Department of Philosophy, University of Mumbai and HSS department on ‘ The philosophy of Donald Davidson and the influence of his ideas in twenty first century’.

As a celebration of World Philosophy Day on November 17, 2017, the department organised a talk on ‘Feminist Art and The Everyday; Rethinking the Politics’ and ‘Living Life care-fully; Recognition, Circumspection, Benediction’

## IDC School of Design

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.

**Academic Programmes:** IDC has a well-established Master of Design degree (MDes) programme in Industrial Design, Communication Design, Animation Design, Interaction Design, Mobility and Vehicle Design & minor courses as well as a PhD programme in Design. The department in 2015 started a four-year, eight semester Bachelor of Design (BDes) programme for which the admission is carried through the undergraduate Common Entrance Examination for Design (UCEED) and a five-year, ten semester dual degree BDes + MDes programme, 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.

	Student Intake	Degrees Awarded
<b>BDes</b>	<b>29</b>	<b>-</b>
<b>MDes</b>	<b>65</b>	<b>63</b>
<b>PhD</b>	<b>7</b>	<b>2</b>

**R&D Activities:** IDC undertakes research and development in the field of Product design, Communication design, interaction design, mobility & vehicle design, and animation and film making. The projects at IDC are subjected to address cultural needs, livelihood and sustainability issues, humanizing technologies for mass use, addressing communication, interaction and product needs of the under-served, typography in local language, interfaces for masses, and conservation and development of ethnic craft techniques.

	Sponsored Projects	Consultancy Projects
<b>New Projects</b>	<b>8</b>	<b>6</b>
<b>Ongoing</b>	<b>27</b>	<b>9</b>
<b>Completed</b>	<b>7</b>	<b>1</b>

Design and Degree Show (DDS) 2017 was organised by the graduating batch on June 9-11, 2017. The event showcased the design projects by the outgoing batch of MDes students of five streams at the IDC School of Design. A 3-day refresher course ‘Expo CD’ on the finer aspects of Communication Design specifically meant for IT and Media professionals was held during July 20-22, 2017. It was aimed to provide information to the participants about the overall aspects of Communication Design for the Digital Media, a deeper understanding of Communication Graphics, Methods for Structuring and Visualization of Information as well as exposure to creative processes for solving communication problems. The department has also organised three-day workshops Expo Pdi and Expo info Design during August 24-26, 2017 and September 21-23,



2017 respectively.

The Typography Day 2018 was organised during March 1-3, 2018 at the Sir J.J. Institute of Applied Art, Mumbai in collaboration with the IDC School of

Design, IIT Bombay with support from India Design Association (InDeAs) and Aksharaya.

The theme of the Typography Day 2018 was 'Beauty, Form and Function in Typography'. The event featured one-day for workshop on Typography and Calligraphy followed by a two-days international conference dedicated to 'Typography and Diversity'. The conference was devoted to addressing issues faced by type designers, type users and type educators. The conference includes presentations by invited keynote speakers, eminent academicians, blind juried papers, industry professionals, research scholars and students. The even will also host an exhibition of selected posters and typographic works of students and faculty members from Design Institutes.

## 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 22 full-time faculty members in all core fields of management.

The year 2017-18 was marked by further strengthening and consolidation of the academic programmes of the School.

**Academic Programmes:** The School of management offers doctoral program (PhD) in Management, full-time Master of Management, Executive MBA (E-MBA) executed 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 BTech (minor courses in all areas of management)

	Student Intake	Degrees Awarded
MMgt	112	115
PhD	08	07
E-MBA	23	22

**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 always on at the School and reshaping the managers, executives and entrepreneurs as future leaders.

	Sponsored Projects	Consultancy Projects
New Projects	3	3
Ongoing	6	2
Completed	0	2

During 2017-18, the school organized an international conference on 'Entrepreneurship and Family Business' jointly with the University of North Texas. Prof. S. Bhargava, IIT Bombay and Dr. Manjula Salimath, University of North Texas, Denton, USA as Conference Chairs coordinated the event. Out of nearly 60 papers, the conference committee recommended 33 papers for presentation on track, available on the link: <https://cob.unt.edu/icefb/tracks>. Prof. P.V. Balaji, Dean (R&D), IIT Bombay and Prof. Marilyn Wiley, Dean, College of Business UNT jointly inaugurated the conference. Twenty-six papers were presented across three days.

The school organized doctoral consortium (sponsored by Deloitte) of PhD Scholars, during February 23-24, 2018 at IIT Bombay to offer a platform for young scholars from all over the country to interact with eminent scholars in academia as well as industry experts in understanding

the advances in theory and applications in management. The theme of the consortium was ‘Recent Advances in Management Science: Theory and Applications’. About 31 PhD scholars from premier academic institutions in India presented their work during the consortium in the areas of Economics and Finance, Information System and Technology Management, International Business, Marketing, Operations Managements, Organizational Behavior and Human Resource Management, Quantitative Techniques and Decision Science, and Strategic Management.

A total of 35 research papers were selected from 96 submissions following two rounds of review by a panel of experts. The two-day event included lectures from distinguished speakers from academia and industry on the theme. Distinguished speakers included Prof. Ashima Goyal, IGIDR Mumbai and Member – Prime Minister Economic Advisory Committee; Prof. B. Mahadevan, IIM Bangalore; Prof. Neeraj Hatekar, Mumbai University; Prof. Vishal Gupta, IIM, Ahmedabad and Mr. Deepak Mane, TCS, Pune. Based on respective Chairperson(s) evaluation(s) four best papers were selected out of 31 papers (in 8 session). Of the 31 papers presented, out of these six papers were selected by experts for a special issues of Global Business Review Journal from SAGE.

## Centre for Environmental Science & Engineering

The Centre for Environmental Science and Engineering (CESE) was established in 1985. The Centre has a core group of 13 faculty members (12 regular and 1 emeritus) with multi-disciplinary background and diversifying research interests. Apart from this, the professionals from consultancies and government organizations come for delivering the lectures time to time.

**Academic Programme:** The centre has started a dual degree MSc – PhD programme since July 2010 in addition to already existing MTech 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- MTech programme will also be started from 2018. In addition to the above programmes, CESE offers an Institute core course “Environmental Studies: Science and Engineering” to undergraduates and MSc – 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
<b>MTech</b>	<b>14</b>	<b>18</b>
<b>DD (MSc + PhD)</b>	<b>5</b>	<b>-</b>
<b>PhD</b>	<b>3</b>	<b>7</b>

**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
<b>New Projects</b>	<b>0</b>	<b>9</b>
<b>Ongoing</b>	<b>8</b>	<b>17</b>
<b>Completed</b>	<b>3</b>	<b>1</b>

## Centre of Studies in Resources Engineering

Established in 1976, the Centre of Studies in Resources Engineering is a teaching academic unit of IIT Bombay. The centre is noted for its research in the areas of mineral exploration, synthetic aperture radar image analysis, hyperspectral image analysis, GPS applications, high performance computing, agro-informatics, cryosphere, and so on. The Centre's work was presented in prestigious conferences, such as IEEE's IGARSS Symposium, ACRS, ISRS, CEOS-workshop in JPL-NASA, Agro-Informatics, and several others.

**Academic Programme:** In addition to undergraduate minor in Geoinformatics for BTech and dual-degree undergraduate students of the Institute, the centre offers MTech and PhD program. In Geoinformatics and Natural Resources Engineering, it has about 106 students in Master's and doctoral programs.

	Student Intake	Degrees Awarded
MTech	24	19
PhD	8	9

**R&D Activities:** The Centre has been actively working on many research and development activities covering geoinformatics and applications.

	Sponsored Projects	Consultancy Projects
New Projects	6	8
Ongoing	17	7
Completed	4	3

## 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. During the year, Mr. Pravin Pardeshi, IAS, Principal Secretary at the Chief Minister's Office, Government of Maharashtra, was the Chief Guest for the centre's convocation held in August 2016.

**Academic Programme:** The centre offers MTech program in Technology and Development and a PhD program. It also offers Technology and Development Supervised Learning (TDSL) courses to BTech 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. A new course 'Development Engineering' aimed to prepare undergraduate students for a career in development and provide a bridge between their disciplinary training and key problems related to the sector. The course is also a part of the Unnat Maharashtra Abhiyan (UMA) framework, and likely to be administered all across Maharashtra.

	Student Intake	Degrees Awarded
MTech	30	22
PhD	4	5

**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.

	Sponsored Projects	Consultancy Projects
New Projects	16	2
Ongoing	32	6
Completed	6	-

## Centre for Formal Design and Verification of Software

The importance of formal methods based software engineering in design and verification of safety critical software was the primary inspiration behind DAE's establishing the Centre for Formal Design and Verification of Software (CFDVS) through BRNS, and in collaboration with IIT Bombay and TIFR. CFDVS started functioning more than a decade back, in 1999. Although the initial focus of the Centre was on design and verification of software, it was quickly realized that the scope of activities needed to be expanded to include both software and hardware systems, in order to provide a comprehensive approach to design and verification of safety-critical systems. Over the past 19 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. Establishing CFDVS has benefited DAE in terms of research and development of advanced formal verification tools.

During the past 19 years, tools and techniques developed at CFDVS have been applied successfully to small and medium sized problems, both from the academia and industry. This has proved the ability to handle the technological challenges involved in addressing complex problems at the small to medium scale. The centre focuses on automated techniques for larger real-life systems, and to make the resulting technologies available to the end-user community in India. This can reap significant benefits in verification projects undertaken at DAE, ISRO, DRDO etc. for two reasons. First, aligning with a global effort in formal verification (the Grand Challenge Problem) would allow leveraging on and building on significant work in the public domain being done by other research groups elsewhere in the world. This not only avoids re-inventing the wheel, but also helps bootstrap quickly so that researchers at CFDVS can work on developing cutting-edge formal verification capabilities beyond those already available today. Second, since the technology is intended to be developed in CFDVS, issues related to technology transfer from foreign organizations to DAE, ISRO, DRDO etc. can be effectively circumvented. Therefore, there exist a strong possibility for the centre to be part of the worldwide effort to address the Grand Challenge Problem in Computing, while continuing to develop theories, prototype tools and techniques for problems relevant in the Indian context.

### Following two new projects were undertaken by the centre during 2017-18:

- FMSAFE – A network centre for Formal Methods in Validation and Certification Procedure for Safety-Critical ICT systems
- IMPRINT Project: Development of a remote healthcare deliver system early diagnosis, therapy, follow up and preventive care for NCDS cardio pulmonary.

## 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:** The centre runs PhD programme offering following specialisations in Planning and Design: Housing, Land use policies, Public Spaces, Risk Management; Policy and Governance: Housing Economics, Health, Education, Employment, Environment; Infrastructure: Building, Transportation & Land use, Urban water, Waste Management, Smart Energy; and Informatics: Citizen Science, Cyber-Physical Systems, Urban Knowledge, Geospatial Technologies. The overall on roll student strength this year is 30.

	Student Intake	Degrees Awarded
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.

	Sponsored Projects	Consultancy Projects
New Projects	4	1
Ongoing	11	1
Completed	1	-

## 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. The Institute 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, provided facilities for the analysis of 29,226 samples. Newly installed facilities at SAIF include 'Q-Exactive Plus Biopharma-High Resolution Orbitrap Liquid Chromatograph Mass Spectrometer (Orbitrap HR-LCMS)' and "600 MHz Nuclear Magnetic Resonance Spectrometer (JEOL ECZR Series) (NMR 600 MHz) has been installed in the 2017.

**Academic Programme:** The centre offers PhD programme in Nanotechnology.

	Student Intake	Degrees Awarded
PhD	17	3

**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 63 faculty members from 12 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 500 high quality publications in the last 10 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 on 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

	Sponsored Projects	Consultancy Projects
New Projects	-	7
Ongoing	1	2
Completed	-	6

## 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 and MOOCs on effective teaching-learning and educational research methodologies through CEP and the Train 10000 Teachers project and IITBombayX. Faculty members and research scholars of the group play a significant role in the organization international conference, carry out sponsored projects for the National Mission on Education through ICT (NMEICT) and provide consultancy to educational technology industries. The group designed and offered a series of new MOOCs for school teachers which saw a total enrolment of over 15000 participants.

**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 BTech, MTech and PhD students in other academic programmes within the Institute. During 2017-18, three new courses were added to the curriculum viz. Learning Analytics, Introduction to Learning Sciences and Discipline-based Education Research.

	Student Intake	Degrees Awarded
PhD	21	3

**R&D Activities:** The main areas of focus of the R&D activities of the group are: Technology-enhanced learning environments for thinking skills (TELoTS), Develop students' which are pan-domain cognitive skills such as, engineering design, problem-posing, estimation, algorithmic thinking, modeling, data representation & analysis. Design, develop and evaluate TELoTS systems for various thinking skills in different domain; Teacher use of educational technology (TUET). Develop and evaluate modes of training such as MOOCs and blended learning. Develop tools to assist teachers in technology integration, analytics; Multimodal study of learning using psychophysiological sensors such as electroencephalogram (EEG), galvanic skin resistance (GSR) and eye tracking.

	Sponsored Projects	Consultancy Projects
New Projects	3	1
Ongoing	6	1
Completed	-	-

During 2017-18 the Next Education Research Lab was set up with funding from Next Education India. The objective of this lab is R&D on the use of emerging technologies for learner-centred education.

## Industrial Engineering and Operations Researchers

Industrial Engineering and Operations Research (IEOR) at IIT Bombay is an interdisciplinary programme that offers PhD and MTech degrees in IEOR and an MSc-PhD Dual Degree in Operations Research. IEOR has nine faculty members and two adjunct professors. Together with other institute faculty members who are associated with the programme in teaching and research, IEOR has a depth and breadth in capability that makes the programme unique in the country. Dr. Yezekael Hayel visited IEOR and delivered a talk on ‘Opinion dynamics in large social networks based on epidemics on graphs’.

**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 19 PhD scholars, 44 MSc-PhD Dual Degree students and 53 MTech students. During autumn semester 2017-18, a new course on ‘Data Analytics in Operations Research’ was offered.

	Student Intake	Degrees Awarded
MTech	27	15
MSc (2 year)	12	6
PhD	7	1
MS	-	1
MSc+PhD	-	1

**R&D Activities:** Faculty members served as referees for several journals and international conferences. The department hosted visitors from academia and industry during 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 Operation Research.

	Sponsored Projects	Consultancy Projects
New Projects	3	4
Ongoing	5	3
Completed	2	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 (MTech/ PhD) in the broad area of Systems and Control. The group has 10 core faculty members and about 11 associated faculty members from other academic units of the institute.

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

	Student Intake	Degrees Awarded
MTech	12	12
DD(MTech+PhD)	-	01
PhD	5	10

**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.

	Sponsored Projects	Consultancy Projects
<b>New Projects</b>	<b>6</b>	<b>-</b>
<b>Ongoing</b>	<b>14</b>	<b>1</b>
<b>Completed</b>	<b>5</b>	<b>-</b>

**Workshop/Conference organized:** The group had organised GIAN Course on Topological Data Analysis by Yuliy Baryshnikov was held at IIT Bombay from 12 - 24 Feb 2018.

## Climate 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 26 faculty participants are drawn from 10 departments across IIT Bombay, with expertise in climate science, technology assessment and policy.

**Academic Programme:** The group aims to achieve educational excellence through a doctoral curriculum of courses in two broad tracks of climate science and climate policy, supplemented by elective courses on a broad range of theoretical and practical topics.

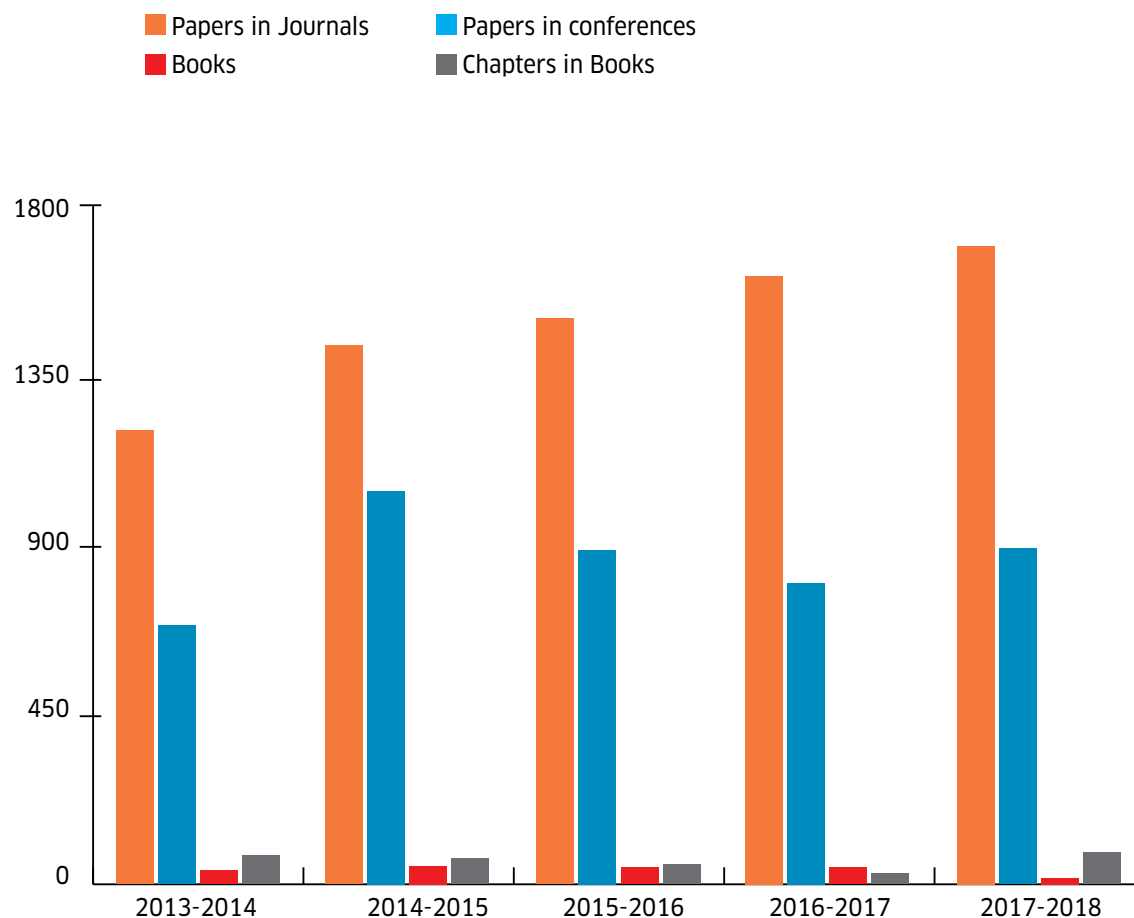
	Student Intake	Degrees Awarded
<b>PhD</b>	<b>7</b>	<b>2</b>

**R&D Activities:** The group focuses on the research areas including Detection, attribution and 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; Climate change impacts on cities; Drivers and Costs of Adaptation; Vulnerability analysis at national, sub-national and community levels; Climate mitigation; Strategies for low-carbon development. Long-term goals include the creation of a pool of multi-disciplinary researchers to serve the growing national need for climate change professionals.

	Sponsored Projects	Consultancy Projects
<b>New Projects</b>	<b>2</b>	<b>-</b>
<b>Ongoing</b>	<b>5</b>	<b>-</b>
<b>Completed</b>	<b>-</b>	<b>-</b>

# Publications

The number of publications by faculty members of IIT Bombay are steadily increasing. From 1206 papers published in national and international journals during the year 2013-14, the total number of papers published in 2017-18 has increased by 491 papers in mere five years, taking the total number of papers published to 1697. Similar trends can be observed for the papers presented and chapters in books published authored by the Institute's faculty, in the graph given below:



Year	Papers in Journals	Papers in conferences	Books	Chapters in Books
2013-14	1206	686	30	75
2014-15	1430	1044	46	59
2015-16	1507	882	39	52
2016-17	1615	800	38	22
2017-18	1697	894	11	83

# Facilities

## Infrastructure Development

IIT Bombay has signed 'Memorandum of Understanding' with Central Public Works Department (CPWD) for taking up construction of infrastructure projects. The CPWD has taken up some major projects which include 'Research Park', 'Hostel No. 17', 'Type-B housing 78 flats (Building No. B-25)', 'Combined building for Society for Innovation and Entrepreneurship (SINE), Industrial Research and Consultancy Centre (IRCC) and IDC School of Design' and are slated to commence in a month or two. Apart from these projects, contractors appointed by CPWD have already started construction of Institute's Infinity Corridor and Vertical extension to the Shailesh J. Mehta School of Management building which will house facility for Executive Education Complex.

The construction work of Padmavihar Guest House has been completed. The internal furnishing work will be completed soon and the new Guest House facility will be made available to the Institute guests. The Padmavihar Guest House has 88 twin rooms and 48 utility apartments, with a 300 seat dining hall and a mini dining hall facility.

The construction of Common building for 'Department of Energy Science and Engineering' and 'Centre for Environmental Science and Engineering' is nearing completion and the departments will start functioning in the next few months.

The construction work of Hostel 18 (1000 capacity), which had begun in March 2017, is also nearing completion. This new hostel is expected to be available for occupation from the January 2019.

All our new projects are designed and built to meet minimum GRIHA-3 standards. Some of the building projects that would be constructed in the near future are: i) 400 apartments for married students, ii) Steel Centre, and iii) Extension of Kendriya Vidyalaya building. Design Consultants have been appointed for these projects after undertaking a 'concept design' competition.

## Central Library

IIT Bombay's Central Library housed in a huge 3-story building having central air-conditioner with state-of-the-art amenities provide a vibrant ambiance to the students, faculties, staff, alumni, and corporate/member users for study, research and access to library resources. The services of the library is backed by an efficient and courteous staff. It holds a vast collection of books, back volume of journals, monographs, standards, reports, thesis/ dissertation and 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 11,000 members during the year. The institutional repository of IIT Bombay publication now has over 20,780 records. During this year 749 Masters degree dissertations, 367 PhD theses and 239 Dual Degree were submitted online.

The Central Library continues to provide access to more than 20,000 e-journals and e-resources and has about 1,388 volumes including books, theses, reports, standards, pamphlets and other reading materials during the year. It also acquired 78 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 render services like reference, consultation, document delivery services, 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 organising the user awareness programmes to enhance their awareness about library resources, services and activities. The library allows users to self check-out of books as well as online renewal of borrowed books. It facilitates interlibrary loan facilities of books and other informational documents for its members as and when required. It also provides internship facilities to Library Science students from other educational sectors. It handled over 67,403 loan





**Prof. D.B. Phatak, Department of Computer Science and Engineering, Prof. A.K. Suresh, Deputy Director (AIA), Prof. P.C. Pandey, Dean (AA), Prof. Sunthar, Department of Chemical Engineering with the Head and Staff Members of Central Library at the launch of Koha - Open Source Integrated Library Management System**

transactions of books and other documents for its members during the year. Central library also offers services to industry and corporates, IIT Bombay alumni and engineering (educational) institutions, professional members and has earned over Rs.13,50,900 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 and two festival holidays). The library remains open till 0100 hrs on all days during examinations. Around the clock air-conditioned reading hall facility with 150 seating capacity for the bonafide users of the library is also available.

The Central Library implemented Koha: Open Source Integrated Library Management System on March 15, 2018. It has replaced the 15 year old proprietary software 'Libsuite'. The Central Library Online Public Access Catalogue (OPAC) can be accessed at: <https://opac.library.iitb.ac.in/>

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

### Computer Centre

The Computer Centre continues to provide improved, efficient and effective computational,

network infrastructural facilities and services to the IIT Bombay user community. This year, the institute's main internet and intranet servers were migrated smoothly to a new modern data centre in the new Computer Centre building with appropriate arrangements for electric power supply (UPS and DG systems) and cooling systems for the server racks.

### Network and Connectivity

The Centre manages the campus network and is responsible for the availability of intra-campus connectivity of with ~25000 wired nodes spread over all the departments, hostels, residential complexes and internet connectivity of Institute with the outside world. In addition, about 1080 wireless access points providing wi-fi access at various departments and other key locations on campus. The following activities were undertaken during the year:

- The total Internet bandwidth for IIT Bombay campus users have been around 10 Gbps from NKN and 3 Gbps from Vodafone
- BGP routing using appropriate routers to connect to the two ISPs
- Internet access is by NATting via four Class C IPv4 address ranges 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 DigiCert

Few external WiFi access points have been deployed on campus to cover student's Hostels. Access through IITB-Wireless for IIT Bombay users, IITB-Guest for guests of IIT Bombay and EduRoam for visitors affiliated with EduRoam partners have been made available along with these wi-fi access point.

Within the power and cooling capacity of the existing Data Centre, a system equipped with 49 HPE Apollo 6000 server called Corona with a theoretical peak of 45 TF is allowing few research groups to carry out scientific computing. Each server has 2 X Intel Xeon 2680 v3 processors and 128 GB of RAM. The system is also connected to a 100 TB of parallel file system as storage. Currently there are 15 users from different research groups using the Corona facility.

**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 represented IIT Bombay in 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. The Computer Centre has registered IIT Bombay as an official mirror for various flavors of Linux Operating Systems on its anonymous FTP server which is available to the user community at large. A new disk storage system having a capacity of 175 RAW data has been purchased to replace the seven year old storage system.

To support the ERP resources of the Institute the disaster recovery (DR) system of ERP is housed in the Computer Centre. The centre staff has supervised the installation and

commissioning of the DR for ERP, and have signed off the landscape documents.

The Institute continues to be a member of Microsoft Imagine Premium (formerly called as 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. License of AVG anti-virus software has been in operation.

The Institute Software Committee solicits, specifies and negotiates the purchase of useful commercially available licensed software for the IIT Bombay Academic community.

Software packages meant for scientific and technical computation such as Abaqus, Maple, Mathematics, Tecplot, 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 and staff in the Institute.

As a step towards paper less office and fast response in terms of searching informations among the members of the respective meetings, the Institute has started using digital meetings for its important high level meetings. This facility has enabled the members and experts of the meetings to electronically participate over the web to review and finalize the proceedings of the meeting.

The Computer Centre encourages and has implemented the use of Open Source Software Systems for Office Automation in about 775 PCs deployed in the various administrative sections of the Institute. The use of Open Source Operating Systems and Software has eliminated to a great extent the menace of the spread of computer virus and thus has optimised the IT support overheads required for network management and PC maintenance. Two users hall at the Computer Centre has been equipped with 120 nos. of all-in-one i5 desktops for multipurpose use.

**Word processing tools and facilities and support:** The Computer Centre provides Open Source Operating Systems which has word processing applications (namely OpenOffice.org, LibreOffice) capable of handling various Indian Languages especially Hindi for the preparation of multilingual (bilingual) documents. Documents prepared in OpenOffice.

org/ LibreOffice (available for Windows as well as Mac OS) can be saved in files compatible (edit/ save) with MS-Office.

**User awareness sessions:** At appropriate intervals and as per requirements Computer Centre conducts a two hour training session on the usefulness of the applications under the Open Source Operating Systems for Office Automation and also apprises about the IT Infrastructure facilities provided by the Computer Centre for the administrative staff of the Institute.

#### **IP CCTV Surveillance activity of the**

**Institute:** The Computer Centre continues to play a secondary role by providing technical support to install and run the newly acquired IP based Security Surveillance Systems having 284 IP cameras and storage 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 about 1000 new 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 IIT Bombay LAN.

**Projects for the Near Future:** Expansion planned for WiFi access: Process for providing additional 400 wireless access points for the academic for “blanket coverage”:

The High Performance Computing (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 IIT Bombay (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.

Currently, the centre is in the process

of building a new Data Centre with major modification to the existing building premises and data centre that will be used to house all the HPC systems of IIT Bombay. This Data Centre will also be used to house the new servers. The centre is also creating a facility to promote Bring Your Own Hardware model, so that all the small clusters/ server scattered over the campus can be brought under the same roof, which will help in reducing power consumption as well as the operational cost.

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**

The ‘outreach’ activities of the Institute continued its growth during the year and were centered around the Centre for Distance Engineering Education Programme (CDEEP). During the year, CDEEP recorded and transmitted 24 courses, covering 11 disciplines at IIT Bombay. It has now an archive of 365 full semester long courses. The centre recorded five courses which are offered as Massive Open Online Course (MOOC) through the National Programme on Technology Enhanced Learning (NPTEL) during the year.

This year contents of 95 courses were supplied to 51 individuals on demand. The viewership (enrolled) of courses through web stood at 2516 for 268 active courses.

Participants find the videos useful and prefer to get evaluated/ graded based on their viewing and interaction with the course faculty even for a previously recorded course. The centre started offering recorded courses with grading by the course faculty from 2017-18.

The centre, covered Institute events such as Annual Convocation, Foundation day, which were webcast live having more than 9000 viewers. The centre covered other 128 events including Institute Colloquia, Seminars and talks by distinguished speakers on campus.

# Organization



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Chairman, Board of Governors



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**Prof. P.M. Mujumdar**  
Dy. Director (Finance & External Affairs)



**Prof. P.V. Balaji**  
Dean (Research & Development)



**Prof. Amitava De**  
Dean (Academic Programmes)



**Prof. Suhas Joshi** (from 22.01.2018) Prof. Ravi Sinha (upto 21.01.2018) Dean (Alumni & Corporate Relations)



**Prof. B.V.S. Viswanadham**  
Dean (Infrastructure Planning & Support)



**Prof. Soumyo Mukherji**  
Dean (Student Affairs)



**Prof. Swati Patankar** (from 02.01.2018) Prof. R.O. Dusane (upto 01.01.2018) Dean (International Relations)



**Prof. Abhay Karandikar**  
Dean (Faculty Affairs)



**Prof. P.C. Pandey** (from 17.04.2017) Prof. Y.M. Desai (upto 16.04.2017) Dean (Administrative Affairs)



**Dr. R. Premkumar**  
Registrar



# IIT Council

The Minister In-charge of Technical Education in the Central Government	1.	Mr. Prakash Javadekar, Hon'ble Minister of Human Resource Development, Government of India, Shastri Bhavan, New Delhi – 110 001.	Chairman
<b>Chairman of Each Institute (Ex-officio)</b>			
Kharagpur	2.	Shri Sanjiv Goenka, Chairman, BoG, IIT Kharagpur (Chairman, RP-Sanjiv Goenka Group Pvt. Ltd., Kolkata).	Member
Bombay	3.	Mr. Dilip Shanghvi, Chairman, BoG, IIT Bombay, Mumbai-400076 (Managing Director, Sun Pharmaceutical Industries Ltd., Sun House, CTS No. 201 B/1, Western Express Highway, Goregaon (E), Mumbai – 400 063).	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.	Mr. R.C. Bhargava, Chairman, BoG, IIT Kanpur, Kanpur – 208 016. (Chairman, Maruti Udyog Ltd., 220, Sector 15A, Noida – 201 301)	Member
Delhi	6.	Mr. Kumar Mangalam Birla (from 18.01.2016), Chairman, BoG, IIT Delhi, New Delhi – 110 016. (Chairman, Aditya Birla Group, 3rd Floor, S.K. Ahire Marg, Worli, Mumbai – 400 030)	Member
Guwahati	7.	Dr. Rajiv I. Modi, Chairman, BoG, IIT Guwahati, Guwahati – 781 039. (Chairman & Managing Director, Cadila Pharmaceuticals Limited, Cadila Corporation Campus, Sarkhej-Dholka Road, Bhat, Ahmedabad -382210, Gujarat)	Member
Roorkee	8.	(Vacant from 24.5.2017 ) Prof. Ashok Misra up to 23.5.2017 Chairman, BoG, IIT Roorkee, Roorkee – 247 667 (Chairman – India, Intellectual Ventures India Consulting Pvt. Ltd., 69 Adarash Vista, Basavanagar, Bangalore – 560 037).	Member
Bhubaneswar	9.	Mr. Pankaj Ramanbhai Patel, Chairman, Board of Governors, IIT Bhubaneswar, Bhubaneswar (Odisha). (Chairman & Managing Director, Cadila Healthcare Limited, Zydus Tower, Satellite Cross Road, Ahmedabad – 380015, Gujarat)	Member



Gandhinagar	10.	Prof. Sudhir K. Jain, Actg. 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.) (Chairman and Managing Director, Infotech Enterprises Ltd. Plot No. 11, Software Unit Layout, Infocity, Madhapur, Hyderabad – 500081.)	Member
Jodhpur	12.	Prof. C.V.R. Murthy, Director, IIT Jodhpur & Acting Chairperson, BOG IIT Jodhpur, Actg. Chairman, Board of Governors, Indian Institute of Technology Jodhpur, Rajasthan.	Member
Indore	13.	Prof. Pradeep Mathur, Director, IIT Indore & Actg. Chairman, Board of Governors, Indian Institute of Technology Indore, Madhya Pradesh	Member
Mandi	14.	Mr. Subhodh Bhargava (from 02.01.2017), Prof. M. Natarajan (upto 01.01.2017), Chairman, Board of Governors, Indian Institute of Technology Mandi, Mandi, Himachal Pradesh (Chairman, TATA Communications Ltd., New Delhi)	Member
Patna	15.	Mr. Ajai Chowdhry, Chairman, Board of Governors, Indian Institute of Technology Patna, Bihar (Founder HCL, 10, Ishwar Nagar, New Delhi -110065)	Member
Ropar	16.	Vacant (from 05.09.2017) Ms. Lila Poonawalla (upto 04.09.2017) Chairman, Board of Governors, Indian Institute of Technology Ropar, Punjab (Padmashree Mrs. Lila Poonawalla, Former CMD, Alfa Laval-Tetra Pak India, Chairperson Lila Poonawalla Foundation, Fili Villa, 101/102, Survey No.23, Balewadi, Baner, Pune 411 045)	Member
Varanasi	17.	Prof. Girish Chandra Tripathi, Chairman, Board of Governors, IIT (BHU), Varanasi and Vice-Chancellor, Banaras Hindu University, Varanasi -221 005, Uttar Pradesh	Member
IIT (ISM) Dhanbad		Prof. D.D. Misra, Chairperson, BOG IIT (ISM) Dhanbad	Member
<b>Director of each Institute (Ex-officio)</b>			
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. Manindra Agarwal, Offtg. Director, Prof. Indranil Manna (upto 07.11.2017), Director, IIT Kanpur, Kanpur – 208 016.	Member
Delhi	22.	Prof. V. Ramgopal Rao, 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. Ajit Kumar Chaturvedi, Director, IIT Roorkee, Roorkee – 247 667.	Member
Bhubaneswar	25.	Prof. R.V. Raja Kumar, 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 Jodhpur, IIT Rajasthan Camp Office, Department of Computer Science & Engineering, MBM Engineering 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. Pushpak Bhattacharyya, Director, Indian Institute of Technology Patna, Govt. Polytechnic, Pataliputra's Colony, Patna – 800 013.	Member
Ropar	32	Prof. Sarit Kumar Das, 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

Dhanbad	34	Prof. Rajiv Shekhar (from March 2018), Director, Prof. D.C. Panigrahi, Offtg. Director Indian Institute of Technology (IIT) (ISM), Dhanbad, Jharkhand– 826004	Member
Tirupati	35	Prof. K.N. Satyanarayana, Director, Indian Institute of Technology, Tirupati, Andhra Pradesh– 517506	Member
Palakkad	36	Prof. P.B. Sunil Kumar, Director, Indian Institute of Technology, Palakkad, Kerala 678557	Member
Goa	37	Prof. B.K. Mishra, Director, Indian Institute of Technology, Goa, 403401	Member
Bhilai	38	Prof. Rajat Moona, Director, Indian Institute of Technology, Bhilai, Chhattisgarh 492015	Member
Dharwad	39	Prof. Seshu Pasumarthu, Director, Indian Institute of Technology, Dharwad, Karnataka 580011	Member
Jammu	40	Prof. Manoj Singh Gaur, Director, Indian Institute of Technology, Jammu, Jammu & Kashmir 181 221	Member
Chairman, University Grants (Ex-officio)	41	Prof. Dharendra Pal Singh, Chairman, University Grants Commission, Bahadurshah Zafar Marg, New Delhi – 110 002.	Member
Director-General, Council of Scientific & Industrial Research (Ex-officio)	42	Dr. Girish Sahni, 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)	43	Dr. P. Rama Rao, Chairman, Governing Council of IISc. Bangalore, (and Former Vice Chancellor, University of Hyderabad, Balapur, Hyderabad 50005) Indian Institute of Science Campus, Bangalore – 560 012.	Member
Director of the Indian Institute of Science, Bangalore (Ex-officio)	44	Prof. Anurag Kumar, Director, Indian Institute of Science, Bangalore – 560 012.	Member
<b>Three Nominees of the Central Government</b>			
To represent the Ministry concerned with Technical Education	45	Special Secretary, Ministry of Human Resource Development, Department of Higher Education, Shastri Bhawan, New Delhi.	Member
To represent any other of Finance	46	Secretary (Expenditure), Ministry of Finance, Department of Expenditure, North Block, New Delhi – 1.	Member
To represent any other Ministry	47	Secretary, Department of Information Technology, Electronics Niketan, CGO Complex, Lodhi Road, New Delhi – 110003.	Member

Nominees of the Visitor Council for Technical Education (AICTE)	48	Prof. Anil D. Sahasrabudhe, 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)	49	Prof. H.C. Verma, Department of Physics, Indian Institute of Technology – Kanpur, Uttar Pradesh	Member
	50	Prof. Vijayalakshmi Ravindranath, Professor & Chair, Centre for Neuroscience, Indian Institute of Science, C.V. Raman Avenue, Bangalore, Karnataka - 561112.	Member
	51	Dr. (Mrs.) Tessy Thomas, Outstanding Scientist & Director Advanced System Laboratory (ASL), Hyderabad – 5600025.	Member
	52	Dr. G. Satheesh Reddy, Scientist Advisor to Raksha Mantri and Director General, Missiles and Strategic Systems, Distinguished Scientist, DRDO	Member
	53	Prof. Vikram M. Gadre, Department of Electrical Engineering, IIT Bombay, Powai, Mumbai 400076	Member
Three Members of Parliament (2 from Lok Sabha) (One from Rajya Sabha)	54	Mr. Ninong Ering, Hon'ble Member of Parliament (Lok Sabha), 92, South Avenue, New Delhi – 110 011.	Member
	55	Mr. Abhishek Singh Hon'ble Member of Parliament (Lok Sabha), Chattisgarh Sadan, Near Safdarjung Hospital New Delhi.	Member
	56	Shri Prabhat Jha, Hon'ble Member of Parliament (Rajya Sabha), C-501, Swaran Jayanthi Sadan, Dr. Bishamber Dass Marg (Near R.M.L), New Delhi-110001.	Member
	57	Mr. R. Subrahmanayam, Secretary (Higher Education), & the current Chairperson, BoG of six new IITs at Tirupati, Jammu, Goa, Dharwad, Bilai-Durg and Palakkad Ministry of Human Resource Development, Department of Higher Education, Shastri Bhawan, New Delhi.	Member
	58	Ms. Darshana M. Dabral, Joint Secretary & Financial Advisor (JS&FA), Ministry of Human Resource Development, Department of Higher Education, New Delhi.	Member
	59	Dr. Sukhbir Singh Sandhu, Additional Secretary (TE) Secretary ( IIT Council), Ministry of Human Resource Development, Department of Higher Education, New Delhi.	Member

### Members of the Board of Governors

Nominated by Visitor	Mr. Dilip Shanghvi, Managing Director, Sun Pharmaceutical Industries Ltd., Sun House, CTS No.201 B/1, Western Express Highway, Goregaon (E), Mumbai – 400 063.	Chairman
Ex-officio	Prof. D.V. Khakhar,	Member
Council Nominees (Four)	Prof. Anurag Kumar Director, Indian Institute of Science, Bangalore – 560012.	Member
	Prof. Rohini Godbole Centre for High Energy Physics, Indian Institute of Science, Bangalore - 560012	Member
	Prof. Vijayalakshmi Ravindranath Chairperson, Centre for Neuroscience, old TIFR Bldg., Indian Institute of Science, Bangalore – 560 012.	Member
	Mr. K. Ananth Krishnan Vice President & Chief Technology Officer Tata Consultancy Services, Tidal Park, Taramani, Chennai – 600 113.	Member

### State Government Nominees (Three)

Maharashtra	Shri Sitaram Kunte, Principal Secretary, Higher & Technical Education, Government of Maharashtra, Mantralaya, Mumbai – 400 032.	Member
Dadra & Nagar Haveli	Shri Praful K. Patel Hon'ble Administrator U.T. of Daman & Diu and Dadra & Nagar Haveli, Silvassa	Member
Goa*	Mr. Ramachandra (Dinar) Balkrishna Bhatkar (upto 24/10/2017) First Floor, Vaikunth Niwas Near Youth Hostel, Miramar, Panaji, Goa - 403001	Member
Senate Two	Prof. K. Narasimhan (from 01.01.18) Department of Met. Engg. & Mats. Science, Prof. Amiya K. Pani (upto 31.12.17) Professor, Department of Mathematics IIT Bombay Mumbai 400 076	Member
	Prof. Chandra Venkataraman (from 01.01.18) Department of Chemical Engineering, Prof. Abhiram Ranade (upto 31.12.17), Professor, Department of Computer Science & Engineering IIT Bombay, Mumbai - 400 076.	Member
Ex-officio	Dr. R. Premkumar, Registrar, IIT Bombay, Mumbai – 400 076	Secretary

\* : According to reconstitution of zones by MHRD, henceforth, IIT Bombay will not have state representative from Goa.



## Members of the Finance Committee

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<b>Mr. Dilip Shanghvi</b> Chairman, Managing Director, Sun Pharmaceutical Industries Ltd., Sun House, CTS No.201 B/1, Western Express Highway, Goregaon (E), Mumbai – 400 063.	Chairman
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<b>Prof. D.V. Khakhar</b> Director, IIT Bombay, Powai, Mumbai – 400 076.	Member (Ex-officio)
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<b>Dr. Sukbir Singh Sandhu, (from 1 March 2018)</b> Shri. R Subrahmanyam, Special Secretary, MHRD (upto 28 February 2018) Additional Secretary, Ministry of Human Resource Development, Deptt. of Higher Education, Government of India, Shastri Bhavan, New Delhi – 110 115.	Member
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<b>Mr. V. B. Aras,</b> 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
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<b>Ms. Darshana M. Dabral</b> Joint Secretary & Financial Advisor Ministry of Human Resource Development Government of India, Shastri Bhavan, New Delhi - 110 115.	Member
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<b>Prof. P. M. Mujumdar</b> Dy. Director (Finance & External Affairs), IIT Bombay, Powai, Mumbai – 400 076.	Member
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<b>Dr. R. Premkumar</b> Registrar, IIT Bombay, Powai, Mumbai – 400 076.	Secretary (Ex-officio)
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## Building and Works Committee

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<b>Prof. D.V. Khakhar</b> Director, IIT Bombay, Powai, Mumbai – 400 076.	Chairman\
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<b>Superintending Engineer</b> Office of the Supdt. Engineer, Mumbai Central Circle-1, CPWD, 5th Floor, Old CGO Building, 101 MK Road, Mumbai – 400 020.	Member
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<b>Superintending Engineer</b> Mumbai (P.W.) Circle 25 Murzban Road, Fort, Mumbai – 400 001.	Member
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<b>Mr. K. Srinivas</b> Head, Architectural & Civil Engg. Division, BARC, North Site, Trombay, Mumbai – 400 085.	Member
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<b>Mr. Vidyadhar K. Phatak</b> 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
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<b>Prof. B.V.S. Viswanadham</b> Dean (Infrastructure Planning & Support), IIT Bombay, Powai, Mumbai – 400 076.	Member
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<b>Dr. R. Premkumar</b> Registrar, IIT Bombay Powai, Mumbai – 400 076	Member-Secretary (Ex-officio)
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## Heads of Departments

**Prof. Avijit Chatterjee**

Aerospace Engineering

**Prof. Rinti Banerjee**

Biosciences & Bioengineering

**Prof. R.D. Gudi**

Chemical Engineering

**Prof. Kerishna P. Kaliappan**

Chemistry

**Prof. T.I. Eldho** (from 04.12.2017)

**Prof. K.V. Krishna Rao** (upto 03.12.2017)

Civil Engineering

**Prof. Uday Khedkar**

Computer Science & Engineering

**Prof. T.N. Singh** (from 03.04.2017)

**Prof. G. Mohan** (upto 02.04.2017)

Earth Sciences

**Prof. B.G. Fernandes**

Electrical Engineering

**Prof. Rangan Banerjee**

Energy Science and Engineering

**Prof. Pushpa Trivedi** (from 22.06.2017)

**Prof. D. Parthasarathy** (upto 21.06.2017)

Humanities & Social Sciences

**Prof. Neela Nataraj**

Mathematics

**Prof. B.P. Puranik** (from 24.08.2017)

**Prof. S.S. Joshi** (upto 23.08.2017)

Mechanical Engineering

**Prof. N. Venkataramani**

Met. Engg. & Mat. Science

**Prof. K.G. Suresh** (from 29.11.2017)

**Prof. C.V. Tomy** (upto 28.11.2017)

Physics

## Heads of Centres

**Prof. Anindya Dutta**

Centre for Research in Nanotechnology and Science & SAIF

**Prof. J. Adinarayana** (from 24.10.2017)

**Prof. B.K. Mohan** (upto 23.10.2017)

Centre of Studies in Resources Engineering

**Prof. Sanjeev Chaudhari**

Centre for Environmental Science and

Engineering

**Prof. G. Sivakumar**

Centre for Formal Design and Verification of Software

**Prof. Avijit Chatterjee** (from 03.04.2017)

**Prof. P. M. Mujumdar** (upto 02.04.2017)

Centre for Aerospace Systems Design and Engineering

**Prof. S.B. Agnihotri** (from 19.05.2017)

**Prof. Milind Sohoni** (upto 18.05.2017)

Centre for Technology Alternatives in Rural Areas

**Prof. Varsha Apte**

Computer Centre

**Prof. Sridhar Iyer**

Centre for Distance Engineering Education Programme

**Prof. Pradipta Banerjee**

Center for Urban Science & Engineering

**Prof. Sanjay Mahajani**

Tata Centre for Technology & Design

## Head of Schools

**Prof. S. Bhargava**

Shailesh J. Mehta School of Management

**Prof. G.V. Sreekumar**

IDC School of Design

## Convenors of Interdisciplinary Programmes

**Prof. Narayan Rangaraj**

Industrial Engineering & Operations Research

**Prof. B. Bandyopadhyay**

Systems & Control Engineering

**Prof. Sridhar Iyer**

Education Technology

**Prof. D. Parthasarthy** (from 18.12.2017)

**Prof. Chandra Venkataraman** (upto 17.12.2017)

Climate Studies

# Summary Of Accounts

## Balance Sheet As At 31/03/2018

(Amount in Rupees)

Particulars Sources Of Funds	Schedule	Current Year 2017-2018	Previous Year 2016-2017
Corpus / Capital Fund	1	1,638,971,749	2,219,237,325
Designated / Earmarked / Endowment Funds	2	5,962,612,238	5,037,739,820
Current Liabilities And Provisions	3	21,946,130,368	17,542,178,178
<b>Total (A)</b>		<b>29,547,714,354</b>	<b>24,799,155,324</b>
Application Of Funds			
Fixed Assets			
Tangible Assets	4	4,467,596,388	4,659,928,405
Intangible Assets	4	10,854,554	9,992,253
Capital Works-In-Progress	4	930,618,920	8,438,147,545
Investments From Earmarked / Endowment Funds	5	54,016,925	41,199,481
Investments – Others	6	2,750,000,000	1,450,000,000
Current Assets	7	9,342,230,408	7,310,644,665
Loans, Advances And Deposits	8	3,616,833,158	2,889,242,975
<b>Total (B)</b>		<b>29,547,714,354</b>	<b>24,799,155,324</b>
Significant Accounting Policies	24		

## Income & Expenditure For The Year Ended 31/03/2018

(Amount in Rupees)

Particulars	Schedule	Current Year 2017-2018	Previous Year 2016-2017
Income			
Academic Receipts	9	928,765,753	711,957,810
Grants/Subsidies (Irrevocable Grants Received)	10	4579,460,000	4,078,649,068
Income From Investments	11	1,363,643,053	970,569,812
Interest Earned	12	2,819,801	3,796,551
Other Income	13	518,637,884	462,683,450
Prior Period Income	14	8,092,505	0
<b>Total (A)</b>		<b>7,401,418,996</b>	<b>6,227,656,691</b>
Staff Payments And Benefits (Establishment Expenses)	15	5,431,230,927	4,032,202,018
Academic Expenses	16	867,027,834	948,247,898
Administrative And General Expenses	17	1,192,025,153	1,008,437,001
Transportation Expenses	18	4,337,864	3,942,011
Repairs & Maintenance	19	411,915,372	502,773,308
Finance Costs	20	398,680	581,539
Other Expenses (Write Off)	21	2,063,153	1,138,903
Prior Period Expenses	22	0	0
Depreciation	4	570,619,580	561,571,100
<b>Total (B)</b>		<b>8,479,618,562</b>	<b>7,058,893,778</b>
Balance being excess of Income over Expenditure (A-B)		-1,078,199,567	-831,237,087
Adjusted from Capital Fund (Depreciation)		570,619,580	561,571,100
Adjusted from Capital Fund (Write off)		2,063,153	1,138,903
Transfer To IRCC Fund		746,086,954	388,739,868
Transfer to General Reserve – Main Account (I)		-1,422,966,411	-779,393,557
Transfer to General Reserve – Donation Fund (II)		171,362,624	122,126,605
Balance Being Surplus/(Deficit) Carried To Corpus/Capital Fund (I+II)		-1,422,966,411	-657,266,952
Significant Accounting Policies	23		
Contingent Liabilities And Notes On Accounts	24		

**Note:** The Value of 1422966411 is arrived after adding deficit of Rs.1426805/- (Recurring) and Rs. 1421539606/- Acturial Value. Provision in r/o Leave Encashment, Gratuity and Pension



### Receipts And Payments For The Period From 01/04/2017 To 31/03/2018

Receipts	Amount In Rs	Payments	Amount In Rs
<b>I Opening Balances</b>		<b>I Expenses</b>	
a) Cash in hand	888,249	a) Establishment Expenses	2,980,205,737
b) Bank Balances		b) Academic Expenses	693,462,707
I. In Current Account	162,228,555	c) Administrative Expenses	722,826,684
II. In Deposit Account	0	d) Transportation Expenses	4,312,965
III. In Saving Account	88,364,835	e) Repairs and Maintenance	400,181,003
		f) Prior Period Expenses	0
<b>II Grant Received</b>		<b>II Payment against Earmarked / Endowment Funds</b>	11,701,372
a) From Government of India (Recurring and Non Recurring)	5,034,760,000		
b) Grant in aid due in 2016-17 received in 2017-18	580,000,000		
c) From State Government	0		
d) One Time Additional Funding	965,000,000		
e) Research Park	253,000,000		
<b>III Academic Receipts</b>		<b>III Payment against Sponsored Projects / Schemes</b>	1,157,574,183
a) Fees from Students	536,264,979		
b) Other Receipts from Students	136,602,001		
c) All India Entrance Examination Receipts	133,561,075		
<b>IV Receipts against Earmarked / Endowment Fund</b>	210,074,129	<b>IV Payment against Sponsored Fellowships and Scholarship</b>	76,877,281
<b>V Receipts against Sponsored Projects / Schemes</b>	2,303,976,611	<b>V Investments and deposits made</b>	
		a) Out of Earmarked / Endowment Fund	0
		b) Out of Own Funds	
<b>VI Receipts against Sponsored Fellowships and Scholarship</b>	88,655,771	<b>VI Term deposits with Schedule Banks</b>	14,435,500,000
<b>VII Income on Investment from</b>		<b>VII Expenditure on Fixed Assets and Capital Work in Progress</b>	
a) Earmarked / Endowment Fund	0	a) Fixed Assets	858,681,420
b) Other Investment	0	b) Work-in-progress	698,717,977

<b>VIII Interest Received on</b>		<b>VIII Other Payment including Statutory Payments</b>	0
a) Bank Deposits	1,393,082,522	a) Other Adjustable Account	1,020,704,902
b) Loans, Advances etc.			
c) Saving Bank accounts			
d) Accrued Interest	0		
<b>IX Investment Encashed</b>	11,631,955,211	<b>IX Refund of Grants</b>	0
<b>X Term Deposits with Schedule Bank Encashed</b>	0	<b>X Deposits and Advances</b>	
		a) Advances Account	284,112,085
		b) Refundable Deposits	86,484,509
		c) Recoverable Deposits	2,488,200
<b>XI Other Income (Including Prior Period Income)</b>		<b>XI Other Payment</b>	
a) Continuing Education Programme	0	a) Grant from other organizations	1,861,44,764
b) Miscellaneous Receipts	240,335,892	b) Sundry Creditors	130,003,847
c) Guest House Receipts	5,383,477	c) Loan - Inter Department	185,000,000
		d) Surplus transfer to Endowment	0
		e) Other Payment - Main	101,641,028
		f) Other Payment – Donation	80,275,143
		g) Other Payment – IRCC	1,309,023,608
a) Advances Account	53,367,340	a) Cash in hand	198,089
b) Refundable Deposits	92,239,977	b) Bank Balances	
c) Recoverable Deposits	994,571	I. In Current Account	492,533,870
		II. In Deposit Account	0
<b>XIII Miscellaneous Receipts Including Statutory Receipts</b>	0	III. In Saving Account	52,044,538
a) Other Adjustable Accounts	36,426,6062		
<b>XIV Any Other Receipts</b>			
a) Grants from other Organisations	324,248,339		
b) Sundry Debtors	140,460,270		
c) Loan - Inter Department	0		
d) Other Receipt – Main	31,010,409		
e) Other Receipt – Donation	38,163,551		
f) Other Receipt – IRCC	1,161,812,088		
<b>Total</b>	<b>25,970,695,913</b>	<b>Total</b>	<b>25,970,695,913</b>







**INDIAN INSTITUTE OF TECHNOLOGY BOMBAY**