



**INDIAN INSTITUTE OF TECHNOLOGY MANDI**

**5<sup>th</sup> Convocation  
Saturday, 7<sup>th</sup> October, 2017**

## **DIRECTOR'S REPORT**



**PROFESSOR TIMOTHY A. GONSALVES**  
**DIRECTOR, IIT MANDI**

Mr. Banmali Agrawala, Chief Guest of the Convocation; Mr. Subodh Bhargava, Chairman of the Board of Governors; members of the Board of Governors; members of the Senate, distinguished guests, graduating students and their family members, my faculty and staff colleagues, dear students, invited guests, the members from the media, and, ladies and gentlemen, it is my distinct honour to welcome you all on the occasion of the 5<sup>th</sup> Convocation of the Indian Institute of Technology Mandi (IIT Mandi). Congratulations to the graduating students on their success. This marks an important milestone in your lives and I hope that your desire to learn and to apply your learning towards societal and scientific needs remains never ending.

Today, we are delighted to have with us Mr. Banmali Agrawala as the Chief Guest of the 5<sup>th</sup> Convocation of IIT Mandi. Mr. Agrawala is currently the President, Infrastructure, Defence and Aerospace of TATA Sons. Before joining the position on 1<sup>st</sup> October, 2017, he was the President and CEO for GE South Asia since February 2013. Being an expert in the energy domain, Mr. Agrawala has almost thirty years of experience across the globe. He has also held several leadership positions in the Wartsila Group and in The TATA Power Group.

Mr. Subodh Bhargava was nominated as the 2<sup>nd</sup> Chairman of the Board of Governors, IIT Mandi in January, 2017. Mr. Bhargava holds the position of Chairman of TATA Communications Ltd. He is a veteran in advising and strategic consulting to growing and/ or start-up businesses. IIT Mandi has gained significantly from his timely support and suggestions even during the short period after his appointment as the Chairman, Board of Governors. Mr. Bhargava has been a friend of IIT Mandi ever since he honoured us as the Chief Guest in our 1<sup>st</sup> Convocation on 20<sup>th</sup> October 2013.

## **B? GRADUATING RESEARCH STUDENTS**

Today, 30 research scholars will be graduating with M.S. (7) or Ph.D. (24) degrees. I am delighted to mention that this is more than double the number of the previous year. Below is the list of these graduates with a short summary of their work.

### **Ph.D., Doctor of Philosophy**

#### **1. Navneet Singh**

*Ph.D. Supervisor: Dr. Bindu Radhamany*

*Title of the Thesis: Electronic and Structural Studies of Transition Metal Oxides*

Study of fundamental issues related to (a) nanoscale phase separation and the physical properties and the origin of low temperature specific heat in the  $\text{La}_{0.2}\text{Sr}_{0.8}\text{MnO}_3$  compound and (b) the link between the local structural parameters and magnetism in quasi one dimensional  $\text{Sr}_3\text{NiRhO}_6$  system.

#### **2. Pushpendra Kumar**

*Ph.D. Supervisor: Dr. Suman Kalyan Pal*

*Title of the Thesis: Energy and Electron Transfer as Probe of the Interfacial Interaction between Quantum Dot and Organic Molecule*

Molecular level understanding of the photo-induced interaction between quantum dot and organic molecule by monitoring energy and electron transfer processes, which take place in the quantum dot-organic molecule interface.

#### **3. Hemant Jalota**

*Ph.D. Supervisor: Dr. Manoj Thakur*

*Title of the Thesis: An Efficient Algorithm for Solving Portfolio Optimization Problem using Semi-Continuous Fuzzy Variable*

Developed algorithms to solve portfolio optimization problems with practical constraints. Novel repair algorithms are proposed to handle all these constraints without the need of any constraint handling technique. Some new portfolio selection models are proposed.

#### **4. Abhishek Gupta**

*Ph.D. Supervisor: Dr. Chayan Kanti Nandi*

*Title of the Thesis: Doped and Functionalized Carbon Dots for Ultrasensitive and Highly Selective Toxic Metal Ions, Biothiols and Neurotransmitter Recognition*

Dealt with the easy and fast microwave assisted synthesis of nitrogen or Sulphur doped carbon dots from different biocompatible precursor molecules, its surface functionalization and finally potential applications on highly selective sensing of toxic heavy metal ions and small biomolecules in live cells.

#### **5. Raj Kumar**

*Ph.D. Supervisor: Dr. Prem Felix Siril*

*Title of the Thesis: A novel Evaporation Assisted Solvent Antisolvent Interaction Method for the Nanocrystallization of Organic Compounds*

Developed a novel evaporation assisted solvent antisolvent interaction (EASAI) method. The applicability was established by successfully preparing nanoparticles of some high energetic compounds and many pharmaceutical drugs with average particle size well below 100 nm.

#### **6. Sunil Kumar**

*Ph.D. Supervisor: Dr. Subrata Ghosh*

*Title of the Thesis: Understanding the Structure-optical property Relationship in New Organic Materials: Design, Synthesis and OLED applications*

Developed a molecular design strategy to develop dual state emitters and electron donor and acceptor units for deep blue emitters. A mechanistic theory was developed. For the first time a wing flapping type behaviour of phenothiazine ring was observed and reported.

#### **7. Manisha Devi**

*Ph.D. Supervisor: Dr. Pradeep Parameswaran*

*Title of the Thesis: Development of New Fluorescent Chemosensors for Various Analytes and Their Evaluation as Molecular Logic Gates*

A series of fluorescent chemosensors was developed for the detection of various metal ions ( $Zn^{2+}$ ,  $Pb^{2+}$  and  $Au^{3+}$ ), anions ( $CH_3COO^-$  and  $F^-$ ), water as well as pH. The photophysical and binding properties of these new fluorescent chemosensors have been explored in detail.

#### **8. Lakshmanan S A**

*Ph.D. Supervisor: Dr. Bharat Singh Rajpurohit and Dr. Amit Jain (Co-Guide)*

*Title of the Thesis: Design & Performance Analysis of Grid Connected Solar PV System*

Designed the control of grid connected solar PV system to meet the improved dynamic performance by grid connected SPV system, effective grid synchronization and power quality (PQ) improvement.

## **9. Reena Sharma**

***Ph.D. Supervisor: Dr. P.C. Ravikumar and Dr. Aditi Halder (Co-guide)***

***Title of the Thesis: Phytochemical Investigation of Roylea cinerea and its Applications.***

Carried out extraction, isolation, characterization and structural elucidation of natural products from aerial part of Roylea cinerea, a medium sized shrub widespread in parts of the Himalaya. Isolated new labdane diterpenoids from different solvent extracts of aerial part of this plant.

## **10. Rajeev Kumar**

***Ph.D. Supervisor: Dr. Bharat Singh Rajpurohit***

***Title of the Thesis: Design and Analysis of Multi-Terminal DC Microgrid.***

The thesis deals with the research work carried out for the design, management, protection and analysis of DC micro-grid.

## **11. Darsi Rambabu**

***Ph.D. Supervisor: Dr. Abhimanew Dhir and Dr. Pradeep Parmeswaran (Co-guide)***

***Title of the Thesis: Metal Organic Materials (MOMs) for Environmental, Biological and Catalytic Applications***

Design and synthesis of new fluorescent hybrid material for recognition of various environmentally significant anions and molecules like sulfate ion, azo dyes. And materials for degradation of environmental pollutants like p-nitro phenol.

## **12. Shilpa Sharma**

***Ph.D. Supervisor: Dr. Pradeep Parameshwaran and Dr. AbhimanewDhir (Co-Guide)***

***Title of the Thesis: Synthesis and Photo-physical Properties of Carbazole and Benzimidazole Based Fluorescent Derivatives***

Sensing of environmentally and biologically significant ions and molecules by use of AIEE active materials. It was aimed at efficient detection of analytes with our hosts in biological medium like blood serum and cells.

## **13. Swati Tyagi**

***Ph.D. Supervisor: Dr. Syed Abbas***

***Title of the Thesis: Analysis of Neural Network Models of Integer and Non-Integer Order***

An investigation of more interesting dynamics in various generalized models of artificial delayed neural networks of both integer order and fractional order to provides insight into the detailed stability analysis of the various delayed models.

**14. Yashwant Kashyap**

***Ph.D. Supervisor: Dr. Anil K Sao***

***Title of the Thesis: Solar Radiation Assessment and Forecasting Over India in the Presence of Dust and Fog Activity***

Estimation and forecasting of solar radiation availability and variability over India based on satellite-derived data and statistical tools. The results are further improved by tracking weather disturbances using satellite images during the presence of dust, fog and clouds.

**15. Pankaj Gaur**

***Ph.D. Supervisor: Dr. Subrata Ghosh***

***Title of the Thesis: Structurally Engineered Biocompatible Molecular Probes for Live cell-imaging and Localization of Native DNA***

The molecular probes with a tailored donor-acceptor conjugated (D- -A and D- -A- -D pull-push systems) molecular architecture have been devised and synthesized to achieve the DNA selectivity and admirable biophysical properties.

**16. Srimanta Mandal**

***Ph.D. Supervisor: Dr. Anil K Sao***

***Title of the Thesis: Novel Approaches for Super Resolution of Intensity/Range Image Using Sparse Representation***

Proposed several novel approaches such as an edge-preserving constraint, employing structural as well as statistical information of patches for learning/selection of dictionary in the framework of sparse representation.

**17. Gurinderbir Singh Grewal**

***Ph.D. Supervisor: Dr. Bharat Singh Rajpurohit***

***Title of the Thesis: Innovation in Energy Management of Induction Machine Based Industrial Plants***

A non-intrusive modified air-gap torque method for experimental estimation of efficiency of induction machine in unbalanced industrial conditions. A low cost, non-intrusive handheld device using PIC microcontroller is fabricated for efficiency estimation in real-time.

**18. Reena Singh**

*PhD Supervisor: Dr. Timothy A. Gonsalves*

*Title of the Thesis: An Access Control Perspective to Sharing Data In A Federation*

Addressed control of access to large volumes of low-value data held by a federation of organisations. The proposed mechanisms work even in the face of intermittent network connections between the organisations.

**19. Pravindra Kumar**

*PhD Supervisor: Dr. Satyajit Thakur*

*Title of the Thesis: Performance Improvement in Orthogonal Frequency Division Multiplexed Based Optical Communication Systems*

Studied the OFDM-PON and OFDM-FSO transmission systems and proposes design solutions to obtain improved performance in terms of bit error rate, receiver sensitivity, link length, spectral efficiency, transmission capacity and maximum achievable rate.

**20. Sachin Kumar**

*PhD Supervisor: Dr. P. Anil Kishan*

*Title of the Thesis: Design of Thermal Protection System for Reusable Hypersonic Vehicle Using Inverse Approach*

Used passive method to modify the flow field in order to reduce the drag and heat transfer to the Reusable Hypersonic Vehicle. Based on his study with a one-dimensional heat transfer model, he designed a light weight passive Thermal Protection System for Reusable Hypersonic Vehicle.

**21. Rajan Kumar**

*PhD Supervisor: Dr. Shripad Mahulikar (Guide) and Dr. Syed Abbas (Co-guide)*

*Title of the Thesis: Study of Laminar Micro-convective Flow With Variable Fluid Properties*

Studied the effects of variable fluid (liquid and gas) of physical properties (density, dynamic viscosity, thermal conductivity, and specific heat at constant pressure) on laminar micro-convective flow through numerical analysis.

**22. Robin Khosla**

*PhD Supervisor: Dr. Satinder Kumar Sharma*

*Title of the Thesis: Alternate High-k Dielectrics for Next-Generation CMOS Logic and Memory Technology*

Investigated the performance, reliability, and lifetime of alternate high- dielectrics by non-destructive nanoscopic and microscopic techniques for CMOS logic, embedded read-only memories and ferroelectric non-volatile memory applications.

### **23. Renu Choudhury**

*PhD Supervisor: Dr. Arti Kashyap*

*Title of the Thesis: Magnetism and Magnetoelectric Effect in Thin Films and Bilayers of Chromia*

Worked on metal-oxides especially, Cr<sub>2</sub>O<sub>3</sub> (Chromia) at the nanoscale and its bilayers with Graphene and Cobalt. Graphene-Chromia based Spin-FET and Cobal-Chromia based MERAM are proposed devices and studied theoretically at an atomic level.

### **24. Himmat Singh**

*Ph.D. Supervisor: Dr. Rahul Vaish*

*Title of the Thesis: Photocatalytic and Electrocatalytic Investigations on Perovskite-based Catalysts for Energy and Environmental Applications*

The aim is to design, realization, functional testing and characterization of double perovskite, CaCu<sub>3</sub>Ti<sub>4</sub>O<sub>12</sub> catalyst and in particular their use for energy and environment related applications.

## **MS (by Research)**

### **1. Tulika Agarwal**

*MS Thesis Supervisor: Dr. Samar Agnihotri*

*Title of the thesis: Secure Analog Network Coding in the Presence of a Single Eavesdropper*

Addresses two fundamental open problems in Information Theory, namely, relay channel capacity characterization and relay channel secrecy capacity characterization in the presence of adversaries and provides an efficient approach to compute tighter capacity lower-bounds.

### **2. Munender Kumar**

*MS Thesis Supervisor: Dr. Renu M Rameshan*

*Title of the thesis: Independent Subspace Analysis for Activity Recognition and fine-grained Classification*

Independent subspace analysis aids data representations which are invariant to certain transformations. A parallel version of ISA is designed for activity recognition in videos. Also, a data set for human water activities was created.



### **3. Vishal Goel**

*MS Thesis Supervisor: Dr. B. D. Chaudhary and Dr. Sriram Kailasam (Co-guide)*

*Title of the thesis: A Stream-Based Scalable Approach for Formal Concept Analysis*

This thesis proposes a distributed stream-based approach that not only addresses skew but also exploits properties of input data to speedup concept discovery.

### **4. Kartik Gupta**

*MS Thesis Supervisor: Dr. Arnav Bhavsar*

*Title of the thesis: Human Action Analysis: Novel Methods and Perspectives*

Experimental analysis of important problems related to human action analysis such as action recognition and temporal action segmentation from depth videos. Analysis of hand grasp and motion attributes for classification of object manipulation actions.

### **5. Shah Vishrut Sunil**

*MS Thesis Supervisor: Dr. Mohammad Talha and Dr. Rajeev Kumar (Co-Guide)*

*Title of the thesis: Numerical and Experimental Study of Bistable Piezoelectric Energy Harvester*

In this research a Bistable Piezoelectric Energy Harvester has been proposed. To harvest the energy over the wide frequency range of environmental vibrations, nonlinearity is introduced in the stiffness by mean of two neodymium magnets.

### **6. Gaurav Chetal**

*MS Thesis Supervisor: Dr. Tulika Srivastava*

*Title of the thesis: Quality Control Approaches for Metagenomic Data Analysis*

Analysis of the quality filtering measures in genomic and metagenomic datasets.

### **7. Asuthosh**

*MS Thesis Supervisor: Dr. Sudhir Pandey*

*Title of the thesis: Design and Fabrication of Fully Automated Experimental Setups for Characterization of Thermoelectric Materials*

Fabrication of low cost experimental setups for measuring the high temperature Seebeck coefficient and thermal conductivity of various materials.

## C? UNIQUE CURRICULUM AND 5 WEEK INDUCTION PROGRAMME

Our B.Tech. curriculum has been designed to produce design engineers and technology-savvy leaders for the future development of India. There is a special focus on real-world team projects throughout. To prepare new B.Tech. students for this curriculum and for them to thrive in the unique ambience of this IIT, a 5-Week Induction Programme (5WIP) has been designed for the 1<sup>st</sup> year B.Tech.

The 2<sup>nd</sup> edition of the 5WIP, conducted during August 2017, was designed to encourage students to 'learn how to learn', to be inquisitive and explorative as future engineers, to see themselves as a part of the society, and to motivate them to attain a strong physical and mental health. The Modules were developed to instill Engineering Skills, Life Skills, Life Essentials as well as Life Enhancement Skills and Inspiring Activities. A schematic representation of the modules under each scheme is given below:



The batch of B.Tech. 2017 was split into 8 groups of 17-20 students each. Each group was led through interactive sessions by faculty mentors. This led to every student making several close friends from diverse backgrounds during their very first days at IIT Mandi. It led to every student getting to know 5-10 faculty well, and at least 1 faculty whom s/he feels comfortable approaching for any personal issue. In the process, each faculty also got to know at least 17-20 students very well.

This mentorship model is expected to serve as one of the most important resources in the residential campus of IIT Mandi. IIT Mandi is the first among all IITs to carry out such an intensive induction programme fully mentored by a large fraction of the faculty members.

#### D? **ACADEMIC ACTIVITIES**

In 2017, 147 B.Tech. students, 55 M.Sc. students and 64 M.Tech students have admitted to various programmes in IIT Mandi. We now have a total of 997 students including 273 Ph.D./MS research scholars. Programme and branch-wise distribution of the students are as follows:

<b>B.Tech</b>	<b>Civil</b> 70	<b>CSE</b> 204	<b>EE</b> 142	<b>ME</b> 128	<b>Total</b> 544
<b>M.Sc.</b>	<b>Chemistry</b> 50	<b>Physics</b> 17	<b>Mathematics</b> 27		94
<b>M.Tech</b>	<b>SCEE</b> 42	<b>SE</b> 26	<b>SBS</b> 18		86
<b>MS by Research</b>					34
<b>Ph.D.</b>					239

With our commitment to gender diversity and equality for women in all aspects, IIT Mandi made a special effort this year to increase the proportion of women students in B.Tech. I am pleased to inform you that we were successful in attracting 22 aspiring young women engineers, up from 6 last year. This achievement was thanks to the efforts of a large team of women faculty, students and alumni led by our GCS Head, Lishma Anand.

The new academic programmes started in 2017:

- Ñ *M.Sc. Physics*
- Ñ *M.Tech. in Power Electronics and Drivers*
- Ñ *M.Tech in Communications and Signal Processing*

IIT Mandi aims to make its mark by encouraging collaborative research by groups of faculty working in well-funded Research Centres. The new research centres started in 2017:

- *The BioX Centre*: This centre was conceived at IIT Mandi in 2012, driven by the need for affordable health care for India, and advanced technology interventions in agriculture and for preservation of the environment in the Himalayan Region. With a critical mass of over 20 faculty from diverse disciplines, the formal structure of the BioX Centre was approved in December 2016 and the BioX Centre building was inaugurated on May 13,

2017. Some of the major research facilities in place at the Centre are – cell culture facility, tissue culture lab, fluorescence microscopy, next-generation genome sequencing, bioreactors, flow cytometer, and stop flow for protein studies.

## **Publications**

IIT Mandi researchers published 118 peer-reviewed articles during the academic year 2016-17. The total number of peer reviewed publications from the institute in National and International Journals is 979 (upto March, 2017).

## **Life after IIT**

The Career and Placement Cell took significant initiatives to conduct a number of career sessions throughout the year to make 1<sup>st</sup> and 2<sup>nd</sup> B.Tech students aware of the many options open to them. These included sessions by inspiring academicians, motivation towards startups by successful entrepreneurs, lectures by civil servants, in addition to the usual corporate pre-placement talks. In the placement season, more than 83% companies that visited were core companies. Branch-wise placement ratios were 89% in CS, 82% in ME and 76% in EE. Besides, 1 MS (Energy Material), 2 M.Tech., (Energy) and 4 Ph.D. students got placed. The Medal winners of this batch have chosen diverse fields after their B.Tech. Samridhi Jain, who will be awarded the President of India Gold Medal, is currently working as a Software Development Engineer at Microsoft India Development Center, Hyderabad. Shivangi Kataria, who will be awarded the Institute Silver Medal and Rani Gonsalves Memorial Medal, has opted to pursue higher studies. She is currently enrolled in the Masters programme in Material Sciences and Engineering at Boston University, USA.

## **Major Academic Achievements**

- Dr. Rahul Shrestha and Dr. Shubhajit Roy Chowdhury (SCEE) received the Best Poster award at IEEE INDICON in December, 2016.
- Dr. Shubhajit Roy Chowdhury (SCEE) received the IAAM Young Scientist Medal in 2017 from the International Association for Advanced Materials at the European Sensors and Actuators Summit at Stockholm, Sweden.
- Rajeev Kumar Chauhan (graduating Ph.D.) won the POSOCO Power System Award (PPSA-2017) in March 2017 and the 2nd Prize (Category ENERGY), in IAS CMD Humanitarian Project Contest, 2017.
- Adil Usman (Student) became the first member from India to be a part of the Electrical Machinery Committee (EMC), IEEE Power & Energy Society, 2017-2018. He is also the first student from an IIT to be an Associate Member of the Institute for Defense Studies

and Analyses, Ministry of Defense, 2015-2020.

- Abhishek Kumar Gupta (graduating Ph.D.) received the prestigious Newton International Fellowship to pursue his post-doctoral research in UK. He will be working on 'Thermally Activated Delayed Fluorescence Materials for Displays and Photodynamic Therapy' at University of St. Andrews, UK.
- Dr. Rajnish Giri (SBS) has been selected as an Associate, Indian Academy of Sciences and an Editorial Board Member of Scientific Reports (Nature Publishing Group).
- Dr. Varun Dutt (SCEE and SHSS) has been selected as the Editor of special issue on Application of Cognitive Approaches to Cyber Security in the journal "Frontiers in Cognitive Science" in June 2017.
- A project proposal on "A Deep Field Legacy Database" by Ayush Yadav (graduating BTech Student) received funding of \$25,860 from the Space Telescope Science Institute, operated for NASA in the Johns Hopkins University.
- Anshul Thakur (Ph.D. student), Jyothi Jain, Padmanabhan Rajan and A.D. Dileep (both Faculty, SCEE) of the MAS Group won the Judge's Award in the Bird Audio Detection Challenge, conducted by the Machine Listening Lab of Queen Mary University, London in February, 2017.
- Deepak Kumar (Graduating student -M.Sc. (Chemistry)) received Erasmus Mundus Fellowship to join a second Masters programme in Theoretical and Computational Chemistry at the University of Valencia, Spain.

## **E? INTERNATIONAL LINKAGES**

IIT Mandi is a part of the international academic community and thus believes in exchange of knowledge across national boundaries. International students can pursue graduate full time degree programs at IIT Mandi. Bachelor's, Master's and Ph.D. students affiliated to institutes in other countries can also spend up to a year at IIT Mandi under existing student exchange programme with academic credit transfer. During the past year, IIT Mandi hosted a number of international students, researchers, and faculty. A summary is provided below.

- Zipporah Wanjiku Muthui visited IIT Mandi from University of Nairobi, Kenya between January-April, 2017 for her Ph.D. thesis work.
- Christian Schürings from the University of Koblenz-Landau, Germany visited IIT Mandi for internship between May-July, 2017.
- Justus Wolf from TU Munich visited IIT Mandi under DAAD RISE program between August-September, 2017.
- Katharina Mengel from RWTH Aachen is visiting IIT Mandi between August, 2017 and March, 2018 under the student-exchange program.
- Simon Riedle and Lennart Schurmann from TU Munich are visiting IIT Mandi between August, 2017 and January, 2018 under the student-exchange program.
- A team of 24 undergraduate students from WPI, USA and two WPI faculty mentors visited IIT Mandi between March-May, 2017 to participate in our ISTEP along with our 3<sup>rd</sup>

BTech students.

In the last year, 11 IIT Mandi students visited university partners abroad. These included:

- 3 students visited Blekinge Institute of Technology, Sweden
- 2 students visited TU, Munich, Germany
- 4 students visited RWTH Aachen, Germany;
- 2 students visited Aalto University, Finland.

A large number of IIT Mandi's faculty members also visited institutions in Europe, North America, Australia, South Asia, and Latin America in 2016-17 for attending conferences and for industry and academic collaborations. A number of IIT Mandi's faculty also visited TU9 institutions in Germany in 2017 under the BMBF-IIT Mandi faculty exchange program.

There were a number of meetings and events conducted at IIT Mandi involving visitors from universities abroad. These include the following:

- IIT Mandi hosted researchers from various universities in the UK and India for a workshop on Nanomaterials for energy, health and sustainability from 3<sup>rd</sup> to 6<sup>th</sup> of October 2016. The workshop was a collaborative effort between IIT Mandi and the University of Nottingham, UK. Dr. Graham Newton from the University of Nottingham coordinated the workshop.
- Prof. Alan Mickelson of the University of Colorado (Boulder, USA) was the Chief Guest at our 8th Foundation Day on 24 February, 2017.
- Dr. Atul Singh Minhas, University of Liverpool, UK participated in the First workshop on IoT systems organized by the School of Computing and Electrical Engineering (SCEE), IIT Mandi, on 6th March, 2017.
- Massachusetts Institute of Technology (MIT), USA joined hands with IIT Mandi and IIT Delhi to conduct a 10-day social innovation boot camp at IIT Mandi. About 50 students of several IITs and engineering colleges across India, along with students from Australia, ASB Malaysia, and MIT, USA participated in this workshop.
- A short term course and a workshop on Adaptronics was inaugurated at IIT Mandi on September 20, 2017. Prof. Michael Sinapius, TU-Braunschweig and the German Aerospace Centre Braunschweig was a key speaker.

In May 2017, the existing MoU between TU Munich and IIT Mandi was renewed for the next three years. IIT Mandi signed an MoU with the Abdus Salam International Centre for Theoretical Physics (ICTP), Italy in March, 2017 for academic and research cooperation for the next three years.

## **F? SPONSORED RESEARCH AND INDUSTRY INTERACTIONS**

This year marked a significant increase in the number of sponsored research projects and total funding. The total number of projects sanctioned till date is 162 with a total sanctioned amount of Rs. 60+ crores. A project titled “Sustainable waste water treatment through bio-photoelectro catalysis and bio production” worth Rs. 3.84 Crore has been sanctioned by MHRD-IMPRINT. Led by Dr. Atul Dhar, the project involves faculty from the School of Engineering and the School of Basic Sciences.

Recently, we had a review of 4 projects funded by SCL, Mohali. SCL currently imports all the 35 chemicals used in the fab line for space, defence, railways and other strategic applications. IIT Mandi faculty under these projects have developed 11 chemicals to replace these imports. Preliminary scientific evaluation by SCL indicates that the IIT Mandi formulations outperform the imports in almost all respects and at a much lower price! The team is now exploring options for commercialisation for sale to SCL, and other fabs in India and abroad. Faculty from the School of Basic Sciences and the School of Engineering led by Prof. Ken Gonsalves and Dr. Subrata Ghosh are involved.

### **6. Business Incubation**

IIT Mandi Catalyst, a Technology Business Incubator (TBI), was launched in May 2016 with an aim to foster entrepreneurship to spawn knowledge-intensive initiatives that would develop innovations useful to the society as a whole. Catalyst is currently supporting commercial and social impact ventures in domains that include Agro-tech, Clean Energy, IT, IOT, Tourism, and Healthcare. Since Jan 2017, Catalyst has received over 100 applications from students/faculty of IIT Mandi and budding entrepreneurs from outside. The current portfolio includes 8 teams. Noteworthy is The Solar Labs, founded by graduating students Siddharth Gangal, Ankush Jindal and Mudit Sahai, who gave up lucrative job offers to pursue their dream in our incubation space. Siddharth Gangal will also be awarded with the Balasundaram Endowment Prize for German in this convocation. Catalyst is funded by DST (5 Crores), IIT Mandi (8 Crores), Vishal Bharat Comnet (10 Lakhs) and HP Government (30 Lakhs).

Catalyst is working with EWOK – Enabling Women in Kamand. Started by several women faculty, EWOK is fostering village-scale businesses by village women. Run by Sandhya Menon, EWOK is incubating about 9 businesses that blend traditional skills with modern technology. EWOK has received Rs. 30 lakhs funding from the HP Government, besides generous donations from alumni and well-wishers.

## **H? CAMPUS DEVELOPMENT**



IIT Mandi has witnessed significant growth during the past year in terms of construction activities, mostly in the North Campus. We have added accommodation for about 350 students and 70 families. In the South Campus, about 2,500 sqm of academic space, an indoor Sports Complex and an open air theatre have been completed. Construction of the balance of Phase 1 is in full swing. The Architect/Design Consultant is in the process of completing the planning/designing for an additional 48,000 sqm in Phase 1X. Construction of Phase 1X is likely to be completed by July, 2019.

With the formation of the Green Committee, headed by Dr. B. Viswanathan, the dusty brown of an under-construction campus, is rapidly giving way to lush green walkways, gardens and playing fields. The Green Committee is actively implementing eco-friendly solid waste management and low-energy transport (on foot, by bicycle, electric vehicles and shared vehicles).

## **1? EXTRACURRICULAR ACTIVITIES**

IIT Mandi encourages students to initiate and participate in various sports and other physical activities and cultural as well as technical events beyond the curriculum. Some of the achievements during the past year:

- IIT Mandi 3<sup>rd</sup> B.Tech. student Nitesh Kumar won the Gold Medal (MS SL3) for India at FZ Forza Irish Para-Badminton International, 2017. The tournament was held in the National stadium at Dublin, Ireland from 22 to 25th June 2017.
- In the Inter IIT Tech Meet, held in IIT Kanpur, during March, 2017, IIT Mandi ranked 4<sup>th</sup> in overall championship. The 'Stock Market Analysis' team comprising of Priyansh Saxena, Siddhant Kumar, Abhigyan Khaund and Neha Muthiyan bagged first place.
- Another achievement was the successful organization of TEDx IITMandi on 14th May, 2017. With the help of IIT Mandi faculty, a team of students led by Vivek Sharma and Sagar Ghai from the B.Tech. graduating batch organized the event for the first time at IIT Mandi despite numerous hurdles. In fact, Vivek Sharma will be awarded the Director's Gold Medal for his all-round performance at the institute.
- Three of the projects under AVISHKAR-2017, the intra-college tech fest, were selected for presentation in the 6<sup>th</sup> International Conference on Engineering and Technology, Science and Management Innovation (ICETSMI-2017) held in Delhi in 2017 and the students participated in the same.

Regular co-curricular events, such as EXODIA, the annual tech-cult fest of IIT Mandi,



VIBGYOR, the art festival, ANUSANDHAN, the research fair, AAGAZ, the annual inter-year sports tournament, Rann Neeti, the annual inter-college sports were organized. *The Hiking and Trekking Club* organised treks to Dalhousie, Shimla and other places in Himachal. Apart from these, this year witnessed several interesting activities to boost the innovative and intellectual activities and skills of students. Some of these events include ***Innovation Challenge*** (a competition on Website/App Design on Paper based on a problem given on the spot), ***Ideathon***(think of an idea related to “Digitization in India” in 6 hours), ***Crowdfund***(a competition, in which participants were given a chance to sell a product to the audience with a fixed amount of virtual money). The ACM Chapter of IIT Mandi organized a special talk on the topic “Software Engineering in Science”.

### **Conclusion**

After 8 years of hard work and dedication despite inconveniences on every front, IIT Mandi is finally enjoying the luxury of our well-developed, fully residential South Campus in Kamand. The North Campus is developing rapidly and already is home to nearly 300 students and close to 50 families. The graduating students are among the last to have studied through the turbulent years of our infancy. Many of you had an almost nomadic life from Mandi to Kamand. I am sure that the experience of thriving despite the odds will stand you in good stead in your life after IIT. In this regard, IIT Mandi is a microcosm of India: a young democracy with a few world-class achievements, with great hope and aspirations, and the will to succeed through thick and thin.