



# Annual Report 2015 - 16



Indian National Academy  
of Engineering

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## Annual Report 2015 - 16



Indian National Academy  
of Engineering





## Foreword

I am extremely delighted to extend my warm greetings to all our Distinguished Fellows, Foreign Fellows and Young Associates and to convey my sincere thanks for their meaningful contributions in fulfilling many milestones set for this year by the Academy. The active involvement of our Fellows has helped us to set the pace for undertaking many more challenging engineering programmes in future. As all of us know that the mandate for the engineering community is in providing the technological solutions for the development of the Country and to improve the lives of the common man. Indeed, we at INAE have been working to achieve this goal. We have lot more to contribute towards many issues pertaining to the engineering challenges and priorities of the country. We are continuously striving hard to reach out to all stakeholders and to strengthen our interfaces with the Government and other concerned agencies, so that we can offer our vast engineering expertise at Academy to provide the right engineering solutions to many of the issues faced by the Country. In this regard, I am happy to mention that INAE has been quite active in taking several new initiatives in this direction in the last one year.

I am pleased to report, some of the major initiatives, to interface with the stakeholders and policymakers. We have put forth serious efforts to enhance the visibility of the Academy in the public domain. One of the major initiatives is to set up an INAE-DST Consultative Committee with the main objective of identifying the specific research in key areas and addressing the engineering issues relevant to the country's needs. It is the endeavour of the Academy to pursue appropriate studies on such identified topics and provide its recommendations to the concerned Agencies. It was agreed that DST would utilize the INAE experts; as members of Project Monitoring Committees to review projects funded by DST; as members of technical Committees constituted by DST from time to time and in seminars/ workshops on topics of national interest organized by DST. One of the recent major initiatives by INAE on the behest of DST was to review the status of present technologies, the gaps and the R&D needed in the short and long term in the field of 'Clean Coal Technologies'.

On similar lines, an INAE- TIFAC Working Committee has been constituted. Recognizing that there is a lot of commonality in the TIFAC Vision 2035 and the INAE Vision 2037 Documents, it was agreed that TIFAC and INAE would jointly identify the pertinent areas of common interest for conduct of future joint studies/activities. As a follow-up action, INAE agreed to take up a study on preparing Global Technology Watch Group with respect to Climate Change and a brainstorming meeting for the same is being organized by INAE.

Another important initiative by INAE is the creation of an Expert Pool with the main aim of identifying domain experts in various disciplines of engineering. There has been a good response from the Fellows and Young Associates in providing the necessary details to the Expert Pool. This initiative has attracted the attention of DST, TIFAC and other agencies and all these agencies have agreed to utilize this expert pool for many of their important tasks. DST and INAE are working towards the setting up of ten Senior Level Fellowships in the field of Engineering akin to JC Bose Fellowship in Science. Based on the initiative from Government, DST approached INAE for development of interactive website for school children in the area of STEM, with the aim of kindling the interest in school children in science and technology and providing them a platform for interaction with the domain experts. The said website is being developed through IIT Kanpur.

INAE organized a meeting with Dr. VK Saraswat, Member, Niti Aayog to explore the possible areas for interaction between them. It was agreed that INAE will assist in providing the inputs in the field of 'Manufacturing in Electronics' and 'Manufacturing of Magnets' and decided to organize a national level seminar in these areas soon.



The fourth Engineers Conclave, the Annual Mega event for engineers is being organized by INAE jointly with IIT Madras this year and the themes of the Conclave are “Engineering Education” to be coordinated by IIT Madras and “Smart Cities” to be coordinated by INAE. The preparations for the event are being progressed actively by IIT Madras and INAE. INAE in close association with Ministry of Urban Development is trying to identify the specific areas in “Smart Cities” where technological interventions are required.

I have immense pleasure in reporting some of the important initiatives and events during the past one year. The INAE Forum on Engineering Interventions for Disaster Mitigation organized two Round Table meetings on Landslide Risk Reduction. The forum addressed the relevant issues pertaining to landslide control involving the subject-specific experts and knowledge institutions across the country. Pertinent engineering recommendations have since been forwarded to the concerned Government Departments and concerned Agencies for necessary follow-up actions.

We are proud to report that the CAETS 2015 Annual Meeting and International Convocation on “Pathways to Sustainability: Energy, Mobility and Healthcare Engineering” held in India for the first time; by INAE at Hotel Ashok, New Delhi was a grand success. Dr Harsh Vardhan, Hon’ble Minister for Science and Technology graced the event and delivered an inspiring address in the Inaugural Session. The Convocation was attended by more than 250 Indian and 100 foreign participants from 24 countries across the world. A total of about 118 INAE Fellows and Young Associates also participated.

The research study sponsored by the office of the Principal Scientific Advisor to the Government of India on “Development of Scientific Automotive Recycling in India and the Role of Research and Development” has been completed recently. A meeting was held with all concerned experts and the report has since been released.

A meeting of the Heads of all Autonomous Institutions of DST presided over by Dr Harsh Vardhan, Minister of Science & Technology, Govt. of India was held at Hyderabad. One of the recommendations was that all Autonomous Institutions must strive to attain self-sufficiency in respect of funds for their functioning. In this regard, INAE is very pleased to report that it has already created the Corpus Fund to meet this objective.

It is heartening to note the enthusiasm and zeal with which the INAE Fellows and Young Associates have contributed to the activities undertaken by the Academy. Efforts are ongoing to increase this participation and also to strengthen the Sectional Committees and energize Local Chapters, some of which have conducted a number of activities including seminars/ meetings, in their vicinity in the recent past. During the General Body Meeting of Fellows this year, a multitude of inspiring ideas have been received on the modalities of engaging the Sectional Committees in engineering activities and programmes. I am sure that this year INAE will have the active involvement of all Sectional Committees in enhancing our engineering activities and programmes.

The Annual Convention 2016 is proposed to be held at Space Applications Centre (SAC), Ahmadabad (Gujarat) during December 2016. We are in the process of finalizing the overall programme and the proceedings for the INAE Annual Convention. We seek the active participation of all our Fellows in this annual networking event.

As always, the feedback and valuable suggestions and guidance on all issues pertaining to the enhancement of our activities and the outreach of the Academy are most welcome and INAE will be happy to utilize all such inputs for the greater advancement of INAE.

I take this opportunity to wish all our Fellows and young Associates much greater success and unique accomplishments in all their future professional endeavours.

Dr BN Suresh  
President, INAE

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## About the Academy

The Indian National Academy of Engineering (INAE), founded in 1987, comprises India's most distinguished engineers, engineer-scientists and technologists covering the entire spectrum of engineering disciplines. INAE functions as an apex body and promotes the practice of engineering & technology and the related sciences for their application to solving problems of national importance. The Academy provides a forum for futuristic planning for country's development requiring engineering and technological inputs and brings together specialists from such fields as may be necessary for comprehensive solutions to the needs of the country.

INAE is the only engineering Academy in India. INAE is a Member of the International Council of Academies of Engineering and Technological Sciences (CAETS). The salient aims and objects of the Academy are given below.

- (a) To promote and advance the practice of engineering and technology and the related sciences and disciplines (hereinafter referred to as 'Engineering') in India and their application to problems of national importance.
- (b) To disseminate among its members information on all matters pertaining to 'Engineering' and to encourage, assist and extend knowledge and information connected therewith by publishing such proceedings, journals, memoirs and other publications as may be desirable and hold meetings, lectures, seminars, symposia etc.
- (c) To interact, after due and detailed consideration, with professional bodies, engineering and scientific academies etc. already established or as may be established in future in India and abroad.
- (d) To promote and safeguard academic and professional interest of persons involved in 'Engineering' (hereinafter referred to as 'Engineer' in India by





laying down a code of ethics which shall be an obligation to be signed by all Fellows of the Academy on admission thereto).

- (e) To provide an association of eminent 'Engineers' and to present at all academic forums research and developmental activities on 'Engineering' on mutually interactive and cooperative basis, both in India and abroad.
- (f) To promote the National Policy on Education of the Government of India as announced from time to time, in all matters of technical education where the Academy is concerned.
- (g) To assist the Government of India, the Local Governments, All India Council of Technical Education and others in analysing, forecasting for the purpose of planning and formulating the policies in respect of education in 'Engineering' and ensuring the appropriate standard thereof.
- (h) To offer the Government of India, the Local Governments and others, facilities for conferring with and ascertaining the views of 'Engineers' as regards matters directly or indirectly pertaining to 'Engineering' and to confer with the said Governments and others in cooperation with other fraternal professional bodies in regard to all matters pertaining to 'Engineering'.
- (i) To encourage inventions, investigations and research and promote their applications for development of both organised and unorganised sectors of the national economy.
- (j) To encourage and promote the pursuit of excellence in the field of 'Engineering'.
- (k) To institute and establish Professorships, Fellowships, Studentships, Scholarships, Awards and other benefactions and to grant Certificates of Competency and Charter whether under any Act of Government of India or otherwise howsoever.
- (l) To do all such other acts and things as are incidental or conducive to the attainment of the above objects or any one of them.



## INAE Governing Council for the Year 2016

|  |                                                                           |                                                                                                                                                                              |
|--|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>President</b>                                                          | : Dr. BN Suresh, Vikram Sarabhai Distinguished Professor, ISRO hqrs., Bangalore                                                                                              |
|  | <b>Immediate Past President</b>                                           | : Dr. Baldev Raj, Director, National Institute of Advanced Studies (NIAS), Bangalore                                                                                         |
|  | <b>Vice-President</b><br>(Academic, Professional & International Affairs) | : Dr. KV Raghavan, INAE Distinguished Professor, Reaction Engineering Laboratory, Indian Institute of Chemical Technology, Hyderabad                                         |
|  | <b>Vice-President</b><br>(Finance & Establishment)                        | : Dr. Sanak Mishra, Formerly Managing Director, Rourkela Steel Plant and Director, Steel Authority of India Ltd.(SAIL); Vice-President, ArcelorMittal and CEO India Project. |
|  | <b>Vice-President</b><br>(Fellowship, Awards & Corporate Communication)   | : Prof. Indranil Manna, Director, Indian Institute of Technology Kanpur.                                                                                                     |
|  | <b>Chief Editor of Publications</b>                                       | : Dr. Purnendu Ghosh, Executive Director, Birla Institute of Scientific Research, Jaipur                                                                                     |
|  | <b>Members</b><br>Engg Section-I                                          | : Prof. Sudhir K Jain, Director, Indian Institute of Technology Gandhinagar, Ahmedabad.                                                                                      |
|  | Engg Section-II                                                           | : Mr. K Ananth Krishnan, Chief Technology Officer, Tata Consultancy Services, Chennai.                                                                                       |
|  | Engg Section-III                                                          | : Prof. ML Munjal, Honorary Professor & INSA Senior Scientist, Department of Mechanical Engineering, Indian Institute of Science, Bangalore.                                 |
|  | Engg Section-IV                                                           | : Prof. MS Ananth, Formerly Director, Indian Institute of Technology Madras, Chennai.                                                                                        |
|  | Engg Section-V                                                            | : Prof. SC Srivastava, Department of Electrical Engineering, Indian Institute of Technology, Kanpur                                                                          |
|  | Engg Section-VI                                                           | : Dr. Rajeev Shorey, Senior Consultant, TCS Innovation Labs., India/USA, Tata Consultancy Services Ltd., Bangalore.                                                          |
|  | Engg Section-VII                                                          | : Dr. G. Satheesh Reddy, Scientific Adviser to Raksha Mantri & Distinguished Scientist, DRDO.                                                                                |



Engg Section-VIII : Prof. BS Murty, Department of Metallurgical & Materials Engineering, Indian Institute of Technology Madras, Chennai.



Engg Section-IX : Mr. MV Kotwal, Formerly Member of the Board & President-Heavy Engineering, Heavy Engineering Division, Larsen & Toubro Ltd., Mumbai.



Engg Section-X : Dr. V Jayaraman, Prof. Satish Dhawan Professor and Senior Advisor (Space Applications) ISRO Headquarters, Bangalore.



Ministry of Science & Technology, Department of Science & Technology : Prof. Sanjay Mittal, Department of Aerospace Engineering, Indian Institute of Technology Kanpur.



Department of Space : Dr. V Narayanan, Deputy Director-Cryogenic Propulsion Engines & Stage Entity & Project Director-C25 Cryogenic Engines Group, Liquid Propulsion Systems Centre, Indian Space Research Organisation, Thiruvananthapuram.



All India Council for Technical Education : Prof. RK Shevgaonkar, Department of Electrical Engineering, Indian Institute of Technology Bombay, Mumbai.



Indian National Science Academy : Prof. Anurag Sharma, Physics Department, Indian Institute of Technology, Delhi.

Indian Academy of Sciences : Prof. Sandeep Sen, Department of Computer Science & Engineering, Indian Institute of Technology, Delhi.



Asiatic Society : Prof. Arunendu Banerjee, Sadananda Sadan, Kolkata.



Indian Science Congress Association : Dr. Er. Nilangshu Bhusan Basu, Principal Chief Engineer (C) & C.M.E. (P & D), The Kolkata Municipal Corporation, Kolkata.



Institution of Electronics and Telecommunication Engineers (IETE) : Dr. Shamim Ahmad, Formerly Director, Central Electronics Engineering Research Institute, (CEERI), Pilani; Formerly Vice-Chancellor, Jamia Hamdard, (Hamdard University), Hamdard Nagar, New Delhi



The Institution of Engineers (India) : Prof. BVA Rao, Chairman, NDRF, Institution of Engineers (India), Bangalore



Confederation of Indian Industry (CII) : Mr. Jibak Dasgupta, Deputy Director, Confederation of Indian Industry (CII), New Delhi.

## INAE Committees

### Sectional Committees

The composition of the ten Sectional Committees are given below.

#### **Sectional Committee-I** **(Civil Engineering)**

##### **Convener**

Prof. CVR Murty

##### **Members**

Dr. SK Kamra  
Mr. MM Madan  
Dr. VN Sharda  
Prof. PL Bongirwar  
Mr. N Raghavan  
Prof. DN Singh  
Prof. Santosh Kapuria  
Prof. Sriman Kumar Bhattacharyya  
Prof. PC Basu  
Prof. Subrata Chakraborty

#### **Sectional Committee-II** **(Computer Engineering and Information Technology)**

##### **Convener**

Prof. Y Narahari

##### **Members**

Dr. Manish Gupta  
Dr. Soumen Chakrabarti  
Prof. Sanghamitra Bandyopadhyay  
Prof. Rajeev Sangal  
Dr. S Ramesh  
Prof. Pankaj Jalote  
Prof. C Pandu Rangan  
Prof. Bhargab B Bhattacharyya  
Mr. PS Dhekne  
Dr. Biswadip Mitra

#### **Sectional Committee-III** **(Mechanical Engineering)**

##### **Convener**

Prof. ML Munjal

##### **Members**

Dr. Pradip Dutta  
Dr. CP Ramanarayanan  
Mr. K Jayarajan  
Prof. K Muralidhar  
Prof. K Ramesh  
Prof. Kshitij Gupta  
Dr. Sekhar Majumdar  
Dr. R Mahadevan  
Prof. BK Dutta  
Mr. A Ramchandani

#### **Sectional Committee-IV** **(Chemical Engineering)**

##### **Convener**

Prof. DV Khakhar

##### **Members**

Dr. VS Patwardhan  
Dr. Ajit V Sapre  
Prof. VG Gaikar  
Dr. BM Reddy  
Dr. Vivek V Ranade  
Mr. DP Misra  
Dr. Rajiv I Modi  
Mr. MB Lal  
Prof. AB Pandit  
Prof. AK Suresh



**Sectional Committee-V**  
***(Electrical Engineering)***

***Convener***

Prof. B Bandyopadhyay

***Members***

Mr. K Sreekumar  
Prof. S Chakravorti  
Prof. G Bhuvaneswari  
Prof. K Gopakumar  
Dr. Chandan Chakraborty  
Dr. M Arunachalam  
Mr. Manjit Singh  
Dr. Sukumar Mishra  
Prof. KR Rajagopal  
Mr. RN Nayak

**Sectional Committee-VI**  
***(Electronics & Communication Engineering)***

***Convener***

Prof. Anurag Sharma

***Members***

Dr. KN Sivarajan  
Mr. CK Pithawa  
Prof. Shibani K Koul  
Dr. JN Roy  
Prof. Souvik Mahapatra  
Dr. SD Sherlekar  
Prof. Navakanta Bhat  
Prof. V Ramgopal Rao  
Prof. Amitava Dasgupta  
Mr. S Varadarajan

**Sectional Committee – VII**  
***(Aerospace Engineering)***

***Convener***

Dr. AR Upadhyay

***Members***

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Dr. V Narayanan  
Prof. Debasish Ghose  
Dr. G. Satheesh Reddy  
Prof. RI Sujith  
Prof. S Suryanarayan  
Prof. B Dattaguru  
Mr. S Chetty  
Mr. VR Katti  
Mr. Tapan Misra

**Sectional Committee – VIII**  
***(Mining, Metallurgical and Materials Engineering)***

***Convener***

Dr. BK Mishra

***Members***

Dr. U Kamachi Mudali  
Prof. Dipak Mazumdar  
Mr. HM Nerurkar  
Dr. U Ramamurthy  
Dr. HS Maiti  
Dr. GK Dey  
Dr. SV Kamat  
Dr. Shrikant V Joshi  
Dr. AK Gupta  
Mr. Debashis Deb

**Sectional Committee-IX**  
***(Energy Engineering)***

***Convener***

Dr. Ajay Mathur

***Members***

Mr. B Prasada Rao  
Dr. SN Singh  
Mr. N Saibaba  
Mr. Pradeep Chaturvedi  
Mr. R Natarajan  
Dr. RK Singh  
Prof. C Balaji  
Mr. PK Wattal  
Dr. J Narayana Das  
Mr. MV Kotwal

**Sectional Committee-X**  
***(Interdisciplinary Engineering and Special Fields)***

***Convener***

Prof. MS Ananth

***Members***

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Prof. Prasun K Roy  
Dr. S Venkata Mohan  
Dr. K Subramanian  
Prof. AK Shukla  
Prof. P Munshi  
Prof. M Sharan  
Dr. J Raghava Rao  
Prof. Rudra Pratap  
Mr. M Narayana Rao

## Other Committees

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#### **Chairman**

Dr. BN Suresh

#### **Members**

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Dr. KV Raghavan  
Dr. Sanak Mishra  
Prof. Indranil Manna  
Mr. VP Sandlas  
Prof. Shibani K Koul  
Dr. Ajay Mathur  
JS&FA, DST

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#### **Members**

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Dr. Sanak Mishra  
Prof. Indranil Manna

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Prof. Anindya Chatterjee  
Prof. AB Bhattacharyya  
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Dr. Purnendu Ghosh  
Dr. M Arunachalam  
Dr. Sunita Sarawagi  
Dr. Rajeev Shorey  
Prof. Nagesh R Iyer  
Dr. AK Gupta  
Prof. BS Murty  
Dr. S Tarafder  
Prof. Kehar Singh  
Prof. G Bhuvaneswari  
Dr. AR Upadhyaya  
Prof. M. Sharan  
Prof. Bikramjit Basu  
Prof. Yendluri Shanthi Pavan



## **AICTE-INAE Programmes Committee**

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Prof. Prem Vrat

Prof. Manoj K Tiwari

### **Teachers Research**

### **Fellowship Scheme**

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Dr. BK Dutta – Rep., DAE

Dr. DM Gaitonde – Rep., DAE

Dr. Hina Gokhale – Rep., DRDO

Prof. CRS Kumar – Rep., DRDO

Dr. MS Chandrasekhar – Rep., DOS

Prof. CS Narayanmurthy - Rep., DOS

Brig SC Marwaha – Convener

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Dr. CR Prasad

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Mr. AK Gupta

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Prof Sriman K Bhattacharyya

Prof Giridhar Madras

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Dr. RR Sonde

Prof. SS Murthy

Dr. Ajay Mathur

Dr. Purnendu Ghosh

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Prof. CVR Murty

Prof. DK Paul

Ms Alpa Sheth

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Dr GK Dey

Dr U Kamachi Mudali

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Dr Kamachi Mudali

Dr GK Dey

Dr Soumitra Tarafder

Prof B.S. Murty

Dr Tim Leverton

### **Advisors**

Dr Baldev Raj

Dr Srikumar Banerjee

Dr Dipankar Banerjee



## Academy Activities

### **Seminars/Workshops/Conferences –National**

The Academy organizes Symposia/Seminars/Workshop/Conferences at national/international levels on topics of national importance. Based on the deliberations, INAE invariably brings out policy recommendations for suitable follow-up action by the concerned Ministry/Department/agency(ies).

#### **The first Roundtable meeting on “Landslide Disasters in India - Some Vexing Issues Related to Landslide Control”**

The INAE Forum on Engineering Interventions for Disaster Mitigation was constituted with the mandate of identifying key areas for disaster risk mitigation and management, where INAE can play a role through its multidisciplinary expertise and take appropriate actions to pursue them with concerned agencies for achieving tangible results and impact. Dr RK Bhandari, FNAE is the Chairman of the Forum. INAE took suo moto cognizance of the sad ground reality that at a time when India is on the fast track of development, disasters due to landslides, among others, are frustrating the progress especially because our track record of managing landslides is very disappointing, the associated engineering practices are unremarkable, the existing institutional mechanisms appear dysfunctional, the culture of safety is on the decline, and worst of all, the frequency, intensity, damage potential and the devastating impact of landslides are on the increase, accentuated by extreme weather events, unregulated urbanization and non-engineered construction. Towards this end, the INAE Forum on “Engineering Interventions for Disaster Mitigation” under the Chairmanship of Dr. RK Bhandari had organized two roundtable meetings.

The first Roundtable meeting on “Landslide Disasters in India -Some Vexing Issues Related to Landslide Control” was organized by the INAE Forum on Engineering Interventions for Disaster Mitigation on Technology Day: 11<sup>th</sup> May 2015 at Central Road Research Institute, New Delhi. Dr RK Bhandari, Chairman, INAE Forum on Engineering Interventions in Disaster Mitigation was the Convenor of the Roundtable. The focus of the Roundtable was to address the relevant issues pertaining to landslide control with the participation of the subject-specific experts and knowledge institutions across the country.

Over 40 senior delegates from INAE Fellowship, academia, R&D organizations and Government Departments/agencies participated in the Roundtable held on May 11, 2015. Seven questions were framed the INAE Forum on Engineering Interventions for Disaster Mitigation through an intensive consultative process for the first roundtable which were posted on INAE website [www.inae.in](http://www.inae.in) prior to the Roundtable with a request for e-participation. The responses received to this questionnaire were discussed during the Roundtable with the objective to arrive at draft actionable recommendations which were to be finalized based on the deliberations. A Backgrounder on “Engineering Interventions in Landslide Risk Reduction” was also circulated to the participants at the Roundtable meeting.

The Roundtable commenced with a Pre-roundtable discussion chaired by Prof Vinod Menon, founder member, National Disaster Management Authority (NDMA) in which the overall programme and plan of action for the conduct of the roundtable was finalized. This was followed by the Inaugural Session in which Gen NC Vij, PVSM, AVSM, Founder VC, NDMA was the Chief Guest. During the Inaugural Address Gen Vij lauded the initiative of INAE Forum on Engineering Interventions for Disaster Mitigation chaired by Dr RK Bhandari in conducting a meeting on a topic of utmost topical importance to the nation. The Vote



of Thanks was then delivered by Dr Gangopadhyay, Director CSIR-CRRI. This was followed by two discussion sessions during which deliberations on the Backgrounder with focus on the draft recommendations in order to suitably modify the same were held. The recommendations were then discussed during the Concluding Session Chaired by Dr Shailesh Nayak, Secretary, Ministry of Earth Sciences, Government of India. Dr Shailesh Nayak in his address highlighted that the topic of the Roundtable is indeed apt and that the societal aspects including generating of awareness also need to be addressed suitably. He appreciated the recommendations and thanked the organizers for their efforts. Twelve recommendations have resulted from the Roundtable which were finalized by the Drafting Committee and forwarded to the concerned Government Departments/ Agencies including National Disaster Management Authority (NDMA), GSI, Ministry of Earth Sciences etc for necessary follow-up actions.

## **2<sup>nd</sup> Round Table Meeting on Landslides Risk Reduction**

The second Roundtable Meeting on “Engineering Interventions for Landslide Risk Reduction and Mitigation in India” was held on Nov 4, 2015 at Central Road Research Institute (CRRI), New Delhi. Dr RK Bhandari, Chairman, INAE Forum on Engineering Interventions for Disaster Mitigation; was the Chair of the Roundtable. The Roundtable was inaugurated by Lt Gen N.C. Marwah (Retd), Member, NDMA and its Valedictory address was delivered by Dr T. Ramasami, FNA, FNAE, Former Secretary, Department of Science and Technology of the Government of India. The motivation for the second INAE Roundtable meeting on landslides held on Nov 4, 2015, came from the sustained urge to extend the interactive dialogue on the Indian landslides to cover topics such as anticipation of landslide hazards through zonation mapping and scientific investigation of landslides for their prevention and control. The main objective of the 2nd Roundtable was to build taller on the recommendations of the 1st Roundtable held on May 11, 2015 by extending the technical discourse to the two additional major issues, namely (1) Anticipation of landslide hazards through large scale landslide hazard mapping, and (2) Science, Engineering and Innovation in Landslide Investigation, studies and management. Ten actionable recommendations have resulted from the deliberations during the Roundtable which are being actively progressed.

## **9<sup>th</sup> National Frontiers of Engineering Symposium (NatFOE)**

The National Frontiers of Engineering Symposium was launched by the INAE in 2006 as its annual flagship event. It brings together about 40 outstanding engineers (ages ~30-45) from companies, universities, and government labs to discuss leading-edge research and technical work across a range of engineering fields. Each year a few disciplines are chosen as focus areas. Convening engineers from disparate fields and challenging them to think about developments and problems at the frontiers of areas different from their own leads to a variety of desirable results. These include collaborative work, the transfer of new techniques and approaches across fields, and establishment of contacts among the next generation of leaders in engineering. The format of the symposia encourages informal collective, as well as one-on-one discussions among participants. Speakers are urged to focus their talks on current cutting-edge research in their disciplines to colleagues outside their field and to address questions such as: What are the major research problems and distinctive tools of your field? What are the current limitations in advancing your field? How might insight derived from other fields contribute to overcoming these limitations? Formulating and answering such questions involves surmounting the barriers imposed by the specialized terminologies and techniques that characterize different branches of science.





The Ninth National Frontiers of Engineering (9NatFoE) Symposium was held on June 5-7, 2015 at IIT Jodhpur. The four sessions of the Symposium were on some of the technology challenges of India viz. Arid Zone Technologies (e.g., Solar Energy, Water, and Green and Smart Buildings), Critical Technologies (e.g., Defence Technologies, and Space Technologies), Healthcare Technologies (e.g., Devices for Diagnostics and Treatment, and Therapeutics) and Automotive Technologies (e.g., Hybrid Transport, and Defense Transport Vehicles). Each session comprised of four talks of 30 minutes each followed by 10 minutes of discussion. A Panel Discussion on “How to increase engagement of IITs in National Technology Missions?” was held with a focus on innovation eco-system problems and solutions, and policy changes required. The panellists included Fellows of INAE. The highlights of the event were the two pre-dinner talks delivered by Dr BN Suresh, President, INAE & Vikram Sarabhai Distinguished Professor, ISRO Headquarters, Bangalore on “Space for National Development” and by Prof. MS Ananth, Formerly Director, IIT Madras on “Research Park in IIT Madras”.

### **Engineers Conclave 2015 (EC-2015)**

INAE has taken an initiative of organizing an annual mega event of engineers as “Engineers Conclave” starting from the year 2013, to be organized with major engineering institutions, on rotation basis, each year. The first “Engineers Conclave” was held jointly with DRDO during Sep 17-19, 2013 at New Delhi which was inaugurated by Shri Pranab Mukherjee, Hon’ble President of India. Second Engineers Conclave 2014 was organized jointly with Indian Space Research Organization (ISRO) in Oct 30-Nov 1, 2014 at Bangalore.

Third Engineers’ Conclave 2015 (EC-2015) was organized jointly with DAE at BARC, Mumbai from September 7-9, 2015. Dr. R.K. Sinha, Chairman, AEC & Secretary, DAE and Dr. B. N. Suresh, President, INAE were the Honorary Chairs of the EC-2015. The Hon’ble Minister of Defence Shri Manohar Parrikar was the Chief Guest during the Inaugural Session for the event.



*Hon'ble Minister of Defence Shri Manohar Parrikar delivering the Inaugural Address during Engineers Conclave 2015*

Besides the Address by the Chief Guest during the Inaugural Session, a Keynote Address by Dr. MR Srinivasan, Former Chairman, Atomic Energy Commission (AEC) was also organized. In addition, four Plenary Talks by Shri Rajendra Singh from Tarun Bharat Sangh on *River Rejuvenation through Community driven Centralized Water Management*; by Dr. S Banerjee, Former Chairman, AEC on *Energy, Environment and Sustainability*; by Shri SK Mehta, Former Director, Reactor group, BARC on *Development of Small and Medium Size Reactors* and by Dr. RK Sinha, Chairman, AEC on *Nuclear Energy: Clean and Sustainable Option* were organized during the two days Conclave.

The Inaugural Session was followed by two parallel technical sessions on respective themes. Each theme had five technical sessions followed by the Panel discussion at the end of each theme. The sessions under Theme I on “Green Energy Options for Sustainable Development” were on: (i) Strategy for Multifold Increase in Installed Nuclear Capacity in India, (ii) Green Energy Options, (iii) Industry Support for Nuclear Energy, (iv) Policy Intervention for Sustainable Development and (v) Renewable Energy Prospects. Similarly, the sessions under Theme II on “Clean India Technologies” were on: (i) Cleaning of Rivers & Water Resource Management, (ii) Industrial Waste Water Management, (iii) Solid Waste Management, (iv) Clean Fuel Technologies and (v) Environment Pollution Control & Carbon Sequestration.



*Release of Proceedings Volume during Engineers Conclave 2015 – From L to R : Dr. BN Suresh, Shri KC Purohit, Dr. RK Sinha, Shri Manohar Parrikar, Dr. Sekhar Basu and Shri RC Sharma*

The event concluded with the Valedictory Session with a view to bring out the Vision for INAE-DAE Initiatives. This session was summed up by Dr. RK Sinha, Chairman, AEC; Dr. BN Suresh, President, INAE and Dr. SK Jain, Former CMD, Nuclear Power Corporation of India Limited.

Eminent experts and senior functionaries from National and State Centres/ Departments, Academia, Industry and DAE and Fellows from INAE participated in large numbers to deliberate on the themes of the EC-2015. These two important themes of the Conclave focused on cutting edge solutions and specific recommendations for development by the concerned agencies are under finalization.



## Seminars/Workshops/Conferences –International

### INAE-NATF Workshop on “Technology and Health-Care” with emphasis on Affordable Healthcare & Bioinformatics

The first joint Workshop with National Academy of Technology, France (NATF) on “Technology and Health-Care” with emphasis on Bioinformatics was held on October 15-16, 2014, at Évry-Génopôle, France. Dr. Rajeev Shorey from INAE and Prof. Bruno Revellin-Falcoz from NATF were the joint coordinators for this Workshop. The topics covered during this event were new medical devices for analysis and diagnostics based on genome sequencing data, such as bio-chips; Genome data-processing software and Genome-related modelling software.

As a follow-up activity of the first workshop, second INAE-NATF Workshop on “Technology and HealthCare” with emphasis on Affordable Healthcare & Bioinformatics was held on April 15-17, 2015 at National Institute of Advanced Studies (NIAS), Bangalore. Dr. Rajeev Shorey from INAE and Prof. PE Bost from NATF were the coordinators of this event. The topics covered during the event were Big data in health-care, Genomic data, Bioinformatics, Clinical Imaging & Bio-engineering, Drug Design, Affordable medical technologies, Ophthalmic research, Virtual Liver etc. The workshop was presided over by Dr. B.N. Suresh, President, INAE and the programme included address by dignitaries including Dr. Baldev Raj, Immediate Past- President, INAE, Prof. Anurag Kumar, Director, Indian Institute of Science, Bangalore and Dr. Pierre-Etienne Bost, NATF, France.

Ten participants from NATF and fifteen participants from INAE including seven from Indian Industry participated in this workshop. The aim of the workshop was to discuss the increasingly technology driven progress in healthcare. The two and a half day workshop included three technical visits to the National Centre for Biological Sciences; Centre for Cellular and Molecular Platforms and Institute for Stem Cell and Regenerative Medicine which was followed by the visit to the company ‘Strand Life Sciences’, which specializes in the mapping of the genome and its applications at affordable price. A pre-dinner talk by Dr. Jenifer Clark, from French Embassy’s Science & Technology Service was also organized. The endeavour of the workshop was to bring out clear and effective recommendations to mutually benefit the two countries through the involvement of the academies, which are under compilation.

### 2nd CAE-INAE Workshop on Clean Coal Technologies

The 2<sup>nd</sup> Canadian Academy of Engineering (CAE) -INAE Workshop for stakeholders in Clean Coal Technologies was held in Toronto, Canada on July 9-10, 2015. A ten member INAE delegation led by Dr KV Raghavan, Vice-President, INAE participated in the conference and technical visits. There overall participation from India and Canada was of about 40 delegates. Prof Ravi Ravindran was the Coordinator of the event from CAE. The conference was inaugurated by the President of Ryerson University. Seven lectures were delivered by the participants from INAE. The Canadian experts delivered 15 lectures on all aspects of clean coal technologies. A special session was organized to identify the clean technology options of mutual interest and the likely participating institutes from both countries and the possible funding sources. It is envisaged that these efforts will pave the way for specific projects to be taken up for joint execution.

As part of the technical visits organized by CAE, the INAE delegates visited the supercritical power plant with near zero emissions at Edmonton Urban Waste Centre which converts the waste to ethanol through



gasification, steam reforming, FT Synthesis and catalytic conversion of methanol to ethanol or DME and also the Centre for Gasification at University of Alberta. The INAE team split into two teams viz., one team visiting Halifax to see University of Dalhousie and Econi coal gasification and power generation facility; and the second team visiting Saskatchewan Carbon Capture Facility at Regina.

## INAE-CAE Young Leaders Conclave



Consequent to the signing of an MoU between Indian National Academy of Engineering (INAE) and Chinese Academy of Engineering (CAE) it was decided to conduct a joint activity between the academies called Young Engineering Leaders Conclave. It was proposed that the participation of about fifteen young engineers from each country be planned. During the Young Engineering Leaders Conclave, young leaders would interact and discuss the methodology to provide leadership to the world and take up the responsibility for growth of their own countries with ethics and focus on sustainability. The first conclave was planned to be held in India.

Accordingly, the first INAE-CAE Young Engineering Leaders' Conclave (ICON-1) was organized jointly by Indian National Academy of Engineering and Chinese Academy of Engineering at Indian Institute of Technology Gandhinagar on October 7- 9, 2015. The event was held preceding the CAETS 2015 Annual Meeting and Convocation on "Pathways to Sustainability: Energy, Mobility and Healthcare Engineering" hosted by INAE on Oct 12-15, 2015 at New Delhi. Young engineering professionals from both the countries were invited to make presentations and deliberate on pioneering technical work and leading-edge research across a range of engineering fields of global importance. Thirty three Indian and twelve Chinese delegates participated in the conclave. The four themes of the conclave were: Clean Water; Big Data; Safety-Culture & Technology and Healthcare Devices. The presentations on the four themes were held in eight technical sessions. Six keynote presentations were also part of the technical sessions. A Panel Discussion was also organized where the four panellists invited questions from the delegates. The four parallel interactive sessions resulted in important recommendations pertaining to each thematic group. The highlights of the conclave were the four plenary talks by four iconic speakers, viz., Dr K. Kasturirangan, INAE Satish Dhawan Chair of Engineering Eminence & Formerly Chairman Space Commission & Secretary, Department

of Space; Mr M.V. Kotwal, L&T; Dr P.S. Goel, Prof MGK Menon, DRDO Chair, Honorary Distinguished Professor, ISRO and formerly Secretary, Ministry of earth Sciences and Dr Shailesh Nayak, former Secretary Ministry of Earth Sciences.

## **INAE, MHRD (GoI) and NAE (USA) Joint Symposium on Engineering Education in the 21st Century: Issues Related to IMPRINT (India) and Grand Challenges (USA) held on Oct 16-17, 2015 at New Delhi**

The INAE, MHRD (GoI) and National Academy of Engineering (NAE), USA Joint Symposium on Engineering Education in the 21<sup>st</sup> Century: Issues Related to IMPRINT (India) and Grand Challenges (USA) was held on Oct 16-17, 2015 at India International Centre, New Delhi. Prof Indranil Manna, Vice-President, INAE and Dr CD Mote, Jr, President, National Academy of Engineering (USA) were the Coordinators of the event from INAE and NAE respectively. Smt Smriti Irani, Hon'ble Minister for HRD was the Chief Guest during the Inaugural Function during which Prof Ashutosh Sharma, Secretary, DST also delivered his Address. The function was attended by over 45 delegates from academia and industry from India and USA.

INAE is an active partner of the National Initiative of Impacting Research Innovation & Technology (IMPRINT) which has been set up to find engineering solutions to the challenges of national importance. In this regard, it has been decided that INAE Fellowship would be involved in all projects undertaken under IMPRINT India. With these initiatives, INAE has made a humble beginning of reaching out the policy makers to enhance its visibility. This activity will further be enhanced in the coming years.



*Smt Smriti Irani, Honble Minister for HRD and other dignitaries during INAE, MHRD (GoI) and NAE (USA) Joint Symposium on Engineering Education in the 21st Century: Issues Related to IMPRINT (India) and Grand Challenges (USA) held at New Delhi*



## INAE Study Group on Indian Engineering Heritage (Metallurgy)

India has a long tradition of outstanding engineering achievements in diverse fields such as monuments, metallurgy, etc. The documentation on these achievements is available in the libraries of Archeological Survey of India, State Museums, Professional Societies and with individuals. It is fragmented and not easily accessible. In this direction, Indian National Academy of Engineering (INAE) constituted an Expert Study Groups on Metallurgy to compile information and documentation on the outstanding engineering achievements and create an Archives of Indian Engineering Heritage in the Library of the Academy. The objective of the Study Group of Indian Engineering Heritage on Metallurgy was constituted to carry out studies related to metallurgical heritage.

Prof. S. Ranganathan, Indian Institute of Sciences, Bangalore was the founder Chairman of the Study Group in Metallurgy. The Study Group has been re-constituted as under:

### ***Honorary Chairmen***

Prof. S. Ranganathan, NIAS, Bangalore

Dr. Baldev Raj, NIAS, Bangalore

### ***Chairman***

Dr. U. Kamachi Mudali, IGCAR, Kalpakkam

### ***Members***

Dr. Anish Kumar, IGCAR, Kalpakkam

Prof. A.K. Biswas, Emeritus AICTE Fellow, Jadavpur University, Kolkata

Dr. R. Balamuralikrishnan, DMRL, Hyderabad

Prof. N.B. Ballal, IIT, Bombay

Dr. Chandra Mohan Nautiyal, Scientist-in-Charge, Radiocarbon Lab. BSIP, Lucknow

Prof. R.K. Dube, IIT, Kanpur

Dr. N.G. Goswami, NML, Jamshedpur

Dr. J. Jayaraj, IGCAR, Kalpakkam

Dr. S. Jaikishan, Hyderabad

Dr. V. Jeyaraj, Hepzibah Institute of Heritage Conservation, Chennai

Prof. Krishnan, MS University, Baroda

Dr. A.K. Lahiri, New Delhi

Dr. R.M. Pillai, RRL, Thiruvananthapuram

Dr. P. Parameswaran, IGCAR, Kalpakkam

Dr. Pravin P.Deshpande, College of Engineering (COEP), Pune

Shri L. Pugazhenthay, ILZDA, New Delhi

Dr. Sharada Srinivasan, NIAS, Bangalore

Dr. T.R. Sharma, Regional Director, ASI, New Delhi

Dr. Soumitro Tarafder, NML, Jamshedpur

Dr. V.K. Saxena, Director (Science), ASI, Dehradun

Dr. S. Srikanth, NML, Jamshedpur

Prof. Vibha Tripathi, BHU, Varanasi

Dr. Vasant Shinde, DC Deccan College, Pune

Dr. T. Venugopalan, Tata Steel, Jamshedpur



## Research Studies

The Academy undertakes studies on important, topical national issues with the objective of preparing a comprehensive/ exhaustive document covering review of existing international and national technological and commercial aspects, analysis of options, future trends and specific implementable policy/recommendations and methodology of execution. The instituted Research Studies are under progress. Project Monitoring Committees (PMC) for these Research Studies have been constituted to review the progress of the study.

### **INAE Research Study on “Design of an Undergraduate Degree programme for Capacity Building in Developing Modern Civil Infrastructure”**

INAE has undertaken a Research Study on “Design of an Undergraduate Degree programme for Capacity Building in Developing Modern Civil Infrastructure” with Prof. SS Chakraborty as Principal Engineering Investigator (PEI), Prof. Prem Krishna, IIT Roorkee as Member and Dr. Pradipta Banerjee, Director, IIT Roorkee as Consultant for this Research Study. The Project Monitoring Committee (PMC) has since been constituted with Dr. Nagesh R Iyer, Formerly Director, CSIR-SERC, Chennai as Chairman, Prof. Mahesh C Tandon, Managing Director, Tandon Consultants Pvt. Ltd and Prof. SK Bhattacharyya, Director, Central Building Research Institute (CBRI), Roorkee as Members and Prof. SS Chakraborty, PEI as Member-Secretary of the Committee.

The objective of this study is to quantify the requirements of the efforts, and keeping in mind that the proposed academic programme is tuned towards development of modern infrastructure, the demand scenario for infrastructure engineers will be worked out. Industry input will be actively sought during the conduct of this exercise. This estimation would consider, *inter alia*, the cross-disciplinary competencies that would become *sine qua non* for infrastructure engineers. Further, in the development of the academic programme, the requirements of a complete skill set, including communication skills, contract and legal matters, risk analysis and management, disaster response, management tools, are being determined and the report has been formulated. The report has also been discussed by INAE Forum on Engineering Education for further improvements. The final recommendations are under compilation and will be finalized shortly.

### **INAE Short-term Research Study on “Development of a robust and User Friendly Software Package for White Light Based Stress using Digital Photoelasticity”**

INAE short-term Research Study on ‘Development of a Robust and User Friendly Software Package for White Light Based Stress using Digital Photoelasticity’ has been initiated with Prof. K Ramesh, IIT Madras, as Principal Engineering Investigator (PEI). The Project Monitoring Committee (PMC) has since been constituted with Prof. S. Narayanan, Dr. R. Mahadevan, Group Technology Director, India Pistons Ltd, Chennai; Prof. T. Sundararajan, IIT Madras; Prof. Shankar Narasimhan, Professor Emeritus, IIT Bombay, Mumbai as Members and Prof. K Ramesh as Member-Secretary. The objective of the project is to develop a comprehensive software package for white light based stress analysis using Digital Photoelasticity. The software will be capable of exploiting the colour information to extract both isoclinic (orientation of principal stress direction) and isochromatic (difference in principal stresses) parameters over the complete model domain using the latest developments in Digital Photoelasticity. The Research Study is under progress.

## Research Studies supported by Principal Scientific Advisor (PSA) to Govt. of India Initiatives in Environmental Protection - Research Study on Recycling of Automotive Waste

A Research Study on “Development of Scientific Recycling of ‘End of Life’ Automobiles with special focus on rubber, plastics and residues in India- The role of Research and Development” was undertaken by INAE under the auspices of Principal Scientific Advisor (PSA) to Govt. of India with Captain NS. Mohan Ram, VSM, Indian Navy (Retd), FNAE & Consultant, TVS Motor Company Limited as the Principal Engineering Investigator and Dr. Basudam Adhikari, IIT Kharagpur & Mr. S.Sugumar, Central Institute of Plastics Engineering as the Members.

The objective of the Research Study was to develop systems for recycling rubber and plastics and to carry out Research and Development on recovery of useful materials from auto shredded residue (ASR) and minimize the extent of residues going into refills. The Study was conducted in three phases. Phase 1 focussed on collection of data on Recycling of ELV’s- automobile production, population, ELV generation, extent of material recoveries, and ASR generation over the next twenty years. Phase 2 focussed on development of laboratory scale processes for material recovery from dismantling non-metallic elements like rubber, plastics, ceramics etc. and proposals for deploying the methods to industrial scale. Phase 3 was concerned with identification of processes for recovery of useful materials and energy from ASR and minimizing the final residues which require landfills. The Report on “Development of Scientific Recycling in India and the Role of Research and Development’ has been brought out recently. A hard copy of the subject report was presented to Dr. R Chidambaram, Principal Scientific Adviser to the Govt. of India by Dr BN Suresh, President, INAE, during a meeting at New Delhi on Feb 23, 2016 in which Dr Sanak Mishra, Vice-President, INAE, Capt NS Mohan Ram and Brig Rajan Minocha, Executive Director, INAE participated.



*Dr BN Suresh, President, INAE presenting a copy of the report to Dr R Chidambaram*



The issue of environmentally friendly disposal of end of life vehicles has assumed center stage consequent to the deteriorating air quality in our cities and judicial pronouncements limiting the age of vehicles. These issues have been duly addressed in the report which deals with R&D required on disposal of rubber and plastics and reduction of recycling residues, which are very important in the long run for India. The report has resulted in pertinent, actionable, recommendations on automotive recycling in general and also generated specific recommendations on the methodologies for disposal of rubber, plastics and auto shredder residues.

### **INAE Research Study on “Scientometric and Engineering Analysis of Technology Trends and Pathways in Organic Chemical Products and Processes”**

The INAE Governing Council during its meeting held on Dec 12, 2013 had approved the research study proposal on “Scientometric and Engineering Analysis of Technology Trends and Pathways in Organic Chemical Products and Processes” for a duration of 24 months with Dr KV Raghavan, FNAE, INAE Distinguished Professor, Indian Institute of Chemical Technology, Hyderabad as the Principal Engineering Investigator. The research study is a follow –up activity of the earlier study sponsored by PSA to Govt. of India on “R&D Impact on Indian Chemical Industry” which was undertaken during 2009-2011 with Dr KV Raghavan as the Principal Scientific Investigator. The study had examined internationalization of intellectual property generation in India, post WTO growth trends on Indian research papers and patents and declining Indian contributions of patented products and processes in Indian chemical sector. A brief study was made on the emerging technological trends in the sub disciplines of aromatics and heterocyclics of organic chemistry discipline. The study has brought out several interesting aspects of technological trends in India. The inspiration to undertake more detailed studies on industrially relevant organic chemical processes and their engineering aspects was derived from this earlier sample study.

The present study on “Scientometric and Engineering Analysis of Technology Trends and Pathways in Organic Chemical Products and Processes” has five major objectives as given below:

- Collection of bibliometric data from searchable (online and offline) national and international data bases on patents and research publications in specific sub areas of organic chemistry and chemical engineering fields;
- A scientometric analysis of collected data sets involving data integration assessment of its inter relationships and evaluation of the data fitness and identification of major technology milestones;
- Evaluation of patented technology generation and filing trends in India, USA, Europe, Japan and China during 2000 to 2012 in specific product and process domains;
- An assessment of Indian situation with reference to the potential technology scenarios and the nature of measures to be undertaken at academic, research and industrial levels to enhance Indian intellectual contribution to global organic chemical engineering development/design inputs;
- Development of a comprehensive monitoring system based on the methodologies to be developed in this programme to sensitize Indian researchers and chemical industry leaders at periodic intervals on the pace and direction of technology growth in critical areas.

A Project Monitoring Committee (PMC) to monitor the research study was constituted with Dr. Utkarsh Palnitkar, Head of Advisery, KPMG India Pvt Ltd., Mumbai as Chairman, Dr. BD Kulkarni and Mr. DP Misra as Members and Dr. KV Raghavan as Member-Secretary. The Research Study is planned to be completed by September 2016.



## Medium Term Research Study on “Disaster Mitigation”

The INAE Governing Council during its meeting held on Dec 9, 2015 at Pune has approved the research study proposal on “Disaster Mitigation”, for a duration of 18 months. Dr RK Bhandari is the Principal Engineering Investigator (PEI) and Prof Satish Chandra, Director CRRI and Dr Kishor Kumar are the Coordinators from the host institution viz Central Road Research Institute (CRRI). The objective of the research study is to study lessons from some of the major disasters in India with focus on analysis of the findings of scientific studies, eye- witness accounts and messages decoded from the signatures left behind by disasters so as to arrive at actionable recommendations for shaping of policies, programmes and national capacities, for disaster prevention and mitigation. The project aims at helping influence and strengthen government policies and enhancing national capacities towards disaster risk reduction through lessons learnt from disasters in the backdrop of the maze of unfiltered documentation, current state-of-the-art and the past experience. It is also envisaged that the project shall present a well considered coherent picture of case records of the disasters studies and that the initiative shall give impetus to identification of problems for advanced research. The research study is under progress.





## Research Schemes

### INAE Chair Professorship

INAE Chair Professorship was instituted in order to encourage engineers/technologists with outstanding research contributions, promote long-term participation in academic research and enhance the research standards in academic institutions. INAE Fellows between the ages of 35 and 65 years, working in well-recognized teaching/research institutions in India are eligible for consideration.

The following nomination was selected as INAE Chair Professor.

- Prof Bhargab B Bhattacharya, Advanced Computing and Microelectronics Unit, Indian Statistical Institute, Kolkata

### INAE Distinguished Professors/Technologists

INAE Distinguished Professors/Technologists Scheme was instituted in order to utilize the expertise of INAE Fellows after superannuation for research in engineering institutions/Research & Development establishments/industry in India. Superannuated Fellows below 70 years of age are eligible for consideration.

The following nominations were selected as INAE Distinguished Professors/Technologists.

- (i) Prof K Chattopadhyay, Honorary Professor, Department of Materials Engineering, Indian Institute of Science, Bangalore
- (ii) Prof AB Mandal, Formerly Director and Outstanding Scientist, CSIR - Central Leather Research Institute, Chennai

### Mentoring of Engineering Teachers by INAE Fellows

INAE undertakes mentoring of Engineering Teachers from recognized Engineering institutions, during the summer vacations; with a view to improving the quality of engineering education.

A total of twelve Engineering Teachers were selected under scheme on “Mentoring of Engineering Teachers by INAE Fellows” this year, as per details given below.

| S. No | Name of Engineering Teacher | Institution of Teacher                                 | Name of Mentor                 | Organization of Mentor               |
|-------|-----------------------------|--------------------------------------------------------|--------------------------------|--------------------------------------|
| 1     | Dr Vishal Mishra            | Netaji Subhas Institute of Technology (NSIT) New Delhi | Prof SN Upadhyay               | IIT (BHU) Varanasi                   |
| 2     | Dr Dharmendra Tripathi      | Manipal University Jaipur                              | Prof Suman Chakraborty         | IIT Kharagpur                        |
| 3     | Dr G Brahma Raju            | National Institute of Technology Warangal              | Prof K Bhanu Sankara Rao       | MGIT Hyderabad                       |
| 4     | Mr Sumanta Ray              | Aliah University, Kolkata                              | Prof Sanghamitra Bandyopadhyay | Indian Statistical Institute Kolkata |

|    |                          |                                                           |                     |                                                   |
|----|--------------------------|-----------------------------------------------------------|---------------------|---------------------------------------------------|
| 5  | Mr Dinesh Yadav          | Manipal University Jaipur                                 | Prof Shibam K Koul  | IIT Delhi                                         |
| 6  | Mr Chetan Dixit          | ITS Engineering College, Greater NOIDA                    | Prof DV Singh       | Amity University, NOIDA                           |
| 7  | Ms Bhavya K              | CMR Institute of Technology, Bangalore                    | Prof ES Dwarakadasa | CMD Karnataka Hybrid Micro devices Ltd, Bangalore |
| 8  | Dr Chinmoy Chattopadhyay | National Institute of Foundry and Forge Technology Ranchi | Prof BS Murty       | IIT Madras                                        |
| 9  | Dr Ajeet Kumar Srivastav | VNIT Nagpur                                               | Prof BS Murty       | IIT Madras                                        |
| 10 | Ms Warisha Meraj         | IFTM University, Moradabad                                | Prof Sukumar Mishra | IIT Delhi                                         |
| 11 | Dr Ashutosh Kumar Dubey  | IIT BHU Varanasi                                          | Prof Bikramjit Basu | Indian Institute of Science Bangalore             |
| 12 | Dr Vishvesh J Badheka    | Pandit Deendayal Petroleum University (PDPU), Gandhinagar | Dr J Krishnan       | MS University, Vadodara                           |

### Mentoring of Engineering Students by INAE Fellows

INAE undertakes mentoring of 3rd /4th year B.E./B.Tech students from recognized Engineering institutions, during the summer vacations; with a view to improving the quality of engineering education.

A total of forty eight Engineering Students were selected under the scheme “Mentoring of Engineering Students by INAE Fellows” this year, as per details given below.

| S No | Name of Engineering Student | Institution of Student                                 | Name of Mentor       | Organisation of the Mentor            |
|------|-----------------------------|--------------------------------------------------------|----------------------|---------------------------------------|
| 1    | Ms Nikita Kumari            | NIT Jamshedpur                                         | Prof BS Murty        | IIT Madras                            |
| 2    | Ms D Sujatha                | RGUKT NUZVID                                           | Prof BS Murty        | IIT Madras                            |
| 3    | Ms Pavithra N               | NIT Jamshedpur                                         | Dr AK Bhaduri        | IGCAR Kalpakkam                       |
| 4    | Mr Akash Srivastava         | NIT Patna                                              | Prof RK Shyamasundar | IIT Bombay                            |
| 5    | Mr Sohom Ghosh              | Heritage Institute of Technology Kolkata               | Prof Sushmita Mitra  | Indian Statistical Institute, Kolkata |
| 6    | Mr Anmol Sharma             | DAV Institute of Engineering and Technology, Jalandhar | Prof Sushmita Mitra  | Indian Statistical Institute, Kolkata |



|    |                           |                                                      |                          |                                         |
|----|---------------------------|------------------------------------------------------|--------------------------|-----------------------------------------|
| 7  | Mr P Deepak Kumar         | IIT (BHU) Varanasi                                   | Prof Nagesh R Iyer       | ACSIR, SERC Campus, Chennai             |
| 8  | Mr Shivam Bharare         | University of Petroleum and Energy Studies, Dehradun | Prof Sanjay Mittal       | IIT Kanpur                              |
| 9  | Ms Smitirupa Biswal       | NIT Jamshedpur                                       | Prof BK Mishra           | IMMT Bhubaneswar                        |
| 10 | Mr Nimeshkumar Suthar     | Pandit Deendayal Petroleum, Gandhinagar              | Dr J Krishnan            | MS University, Vadodara                 |
| 11 | Mr Ashish Dave            | Pandit Deendayal Petroleum, Gandhinagar              | Dr J Krishnan            | MS University, Vadodara                 |
| 12 | Mr Ayush Pradhan          | NIT Rourkela                                         | Prof G Panda             | IIT Bhubaneswar                         |
| 13 | Mr Sidharth Behera        | NIT Rourkela                                         | Prof G Panda             | IIT Bhubaneswar                         |
| 14 | Ms Jayasree Rentala       | RGUKT NUZVID                                         | Prof K Bhanu Sankara Rao | MGIT Hyderabad                          |
| 15 | Ms Priyanka Vinod Khandal | VNIT Nagpur                                          | Prof K Bhanu Sankara Rao | MGIT Hyderabad                          |
| 16 | Mr Sayan Sarkar           | NIT Durgapur                                         | Prof Subrata Chakraborty | IEST Shibpur                            |
| 17 | Mr Bakam Anjaneyulu       | MGIT Hyderabad                                       | Shri M Narayana Rao      | MTAR Technologies Pvt Ltd, Hyderabad    |
| 18 | Mr Dodda Sahithya         | MGIT Hyderabad                                       | Shri M Narayana Rao      | MTAR Technologies Pvt Ltd, Hyderabad    |
| 19 | Ms Kolli Samanwitha       | MGIT Hyderabad                                       | Dr G Madhusudhan Reddy   | DMRL Hyderabad                          |
| 20 | Ms. Ashin Jose            | Amal Jyothi College of Engineering, Kottayam         | Dr G Madhusudhan Reddy   | DMRL Hyderabad                          |
| 21 | Mr Paduri Vikas Reddy     | MGIT Hyderabad                                       | Dr G Sundararajan        | ARCI Chennai                            |
| 22 | Ms R Krithika             | MGIT Hyderabad                                       | Dr G Sundararajan        | ARCI Chennai                            |
| 23 | Ms Anwesha Chakraborty    | NIT Jamshedpur                                       | Dr DK Paul               | IIT Roorkee                             |
| 24 | Ms Arti Kumari            | NIT Jamshedpur                                       | Prof Prem Krishna        | M/s Skeleton Consultants Pvt Ltd, NOIDA |
| 25 | Ms Ankita                 | NIT Jamshedpur                                       | Prof Prem Krishna        | M/s Skeleton Consultants Pvt Ltd, NOIDA |

|    |                         |                                              |                        |                                       |
|----|-------------------------|----------------------------------------------|------------------------|---------------------------------------|
| 26 | Ms Aarushee Agrawal     | NIT Jamshedpur                               | Dr. T. Venugopalan     | Tata Steel Jamshedpur                 |
| 27 | Ms Ankita Kumari        | NIT Jamshedpur                               | Prof GV Anand          | Indian Institute of Science Bangalore |
| 28 | Mr Saikat Datta         | IEST, Shibpur                                | Prof Bhabatosh Chanda  | Indian Statistical Institute, Kolkata |
| 29 | Mr Aniruddha Das        | IEST, Shibpur                                | Prof Bhabatosh Chanda  | Indian Statistical Institute, Kolkata |
| 30 | Mr Sunny Kumar Singh    | Jadavpur University, Kolkata                 | Prof Suman Chakraborty | IIT Kharagpur                         |
| 31 | Mr Arpan Misra          | Jadavpur University, Kolkata                 | Prof Suman Chakraborty | IIT Kharagpur                         |
| 32 | Mr Mannem Balakrishna   | RGUKT Basar                                  | Dr SV Kamat            | DMRL Hyderabad                        |
| 33 | Mr Ungarla Prem Kumar   | RGUKT Basar                                  | Dr SV Kamat            | DMRL Hyderabad                        |
| 34 | Mr S Ganesh             | RGUKT NUZVID                                 | Dr. N. Saibaba         | Nuclear Fuel Complex, Hyderabad       |
| 35 | Mr Paulson Varghese     | Amal Jyothi College of Engineering, Kottayam | Dr GK Dey              | BARC, Mumbai                          |
| 36 | Mr Febin Joseph         | Amal Jyothi College of Engineering, Kottayam | Dr GK Dey              | BARC, Mumbai                          |
| 37 | Mr Rahul Kumar Singh    | IIT (BHU) Varanasi                           | Prof P. K. Sikdar      | IC&T Pvt Ltd, New Delhi               |
| 38 | Ms Madhu Kumari         | NIT Jamshedpur                               | Prof P. K. Sikdar      | IC&T Pvt Ltd, New Delhi               |
| 39 | Mr Aditya Devputra      | IIT Bhubaneswar                              | Prof Pradip Dutta      | Indian Institute of Science Bangalore |
| 40 | Mr Abhay Joshi          | Matsrusri Engineering College Hyderabad      | Prof Shiban K Koul     | IIT Delhi                             |
| 41 | Mr B Hithesh Sekhar     | Shiv Nadar University, UP                    | Prof Shiban K Koul     | IIT Delhi                             |
| 42 | Mr Pradeep Kumar Sharma | ITS Engineering College, Greater NOIDA       | Prof DV Singh          | Amity University, UP                  |
| 43 | Mr Pranabesh Bala       | Jadavpur University, Kolkata                 | Prof SV Kulkarni       | IIT Bombay                            |



|    |                           |                                                         |                         |                                          |
|----|---------------------------|---------------------------------------------------------|-------------------------|------------------------------------------|
| 44 | Mr Divesh Jain            | Veer Surendra Sai<br>University of Technology,<br>Burla | Prof Sukumar Mishra     | IIT Delhi                                |
| 45 | Mr Bishal Dash<br>Kaushik | Veer Surendra Sai<br>University of Technology,<br>Burla | Prof Sukumar Mishra     | IIT Delhi                                |
| 46 | Ms Namrata<br>Mazumder    | MGIT Hyderabad                                          | Prof K<br>Chattopadhyay | Indian Institute of<br>Science Bangalore |
| 47 | Ms Shweta                 | PEC University of<br>Technology, Chandigarh             | Prof Vinay K Gupta      | IIT Kanpur                               |
| 48 | Ms Nitasha Sahani         | Silicon Institute of<br>Technology, Bhubaneswar         | Prof PK Dash            | SOA University,<br>Bhubaneswar           |



## INAE Forums

### Forum on Technology Foresight and Management

Indian National Academy of Engineering (INAE) constituted a “INAE Forum on Technology Foresight and Management for addressing National Challenges”. Shri VK Agarwal, Formerly Chairman, Railway Board & Ex-officio Principal Secretary, Govt. of India is the Chairman, with other INAE Fellows and experts as Members.

The objective of the forum is to prepare a roadmap for addressing National Challenges. The domain of national challenges being very wide and transient, this Forum addresses some of the major issues such as Food Production and Utilization and Conservation of Water; Energy Generation and Utilities; Manufacturing Technologies; Mass Transit Systems and Building and Construction Technologies. This Forum endeavours to evolve solutions keeping in view the issues of sustainable development, poverty reduction, and climate change in focus and suggests appropriate technologies accordingly. Further, suitable Engineering Management techniques are employed to find cost effective and optimal solutions.

The first Report of the Forum has been published on the pertinent issues related to “Waste Management”; “Water – Meeting the Future Challenges” and “Transport – Making it Greener”. The report provides a perspective and an action plan for implementation. The report is based on the suggestions regarding minimization of waste generation (prevention / reduction), optimal waste recovery (reuse/recycling) and the effective waste treatment and disposal that are the need of the hour. Suitable waste-to-energy (WTE) approaches are also being explored. Access to water and sanitation at an affordable price and the vision for transport to improve the share of environmental-friendly transport mode has also been covered. The second Report of the forum is under compilation. This report aims to focus on the issues related to Agriculture – Waste Reduction & its Use, Energy – Major Thrust on solar & Mass Transit Systems.

### Forum on Engineering Interventions in Disaster Mitigation

The Forum on Engineering Interventions for Disaster Mitigation was constituted with Dr RK Bhandari, FNAE as Chairman. This objective of the Forum is to identify key areas for disaster risk mitigation and management, where INAE can play a role through its multidisciplinary expertise and take appropriate actions to pursue them with concerned agencies for achieving tangible results and impact. INAE took suo moto cognizance of the sad ground reality that at a time when India is on the fast track of development, disasters due to landslides, among others, are frustrating the progress especially because our track record of managing landslides is very disappointing, the associated engineering practices are unremarkable, the existing institutional mechanisms appear dysfunctional, the culture of safety is on the decline, and worst of all, the frequency, intensity, damage potential and the devastating impact of landslides are on the increase, accentuated by extreme weather events, unregulated urbanization and non-engineered construction.

Despite the daunting task of developing and implementing dynamic plans to minimize losses due to landslides in complex and diverse geotechnical settings with disturbing previous history, a pro-active strategic and determined approach can put us back on the path to safety because, unlike earthquakes and tsunamis, most landslides are predictable, preventable, and controllable, if managed with appropriate interventions of S&T. The expenditure in managing slopes and landslides will doubtless show up as an investment- all we need is a strong political and administrative will to protect our highly fragile eco-systems, built-environment, strategic borders, crowded townships, and life-line infrastructure.



A nation-wide consultation programme was undertaken by INAE to prepare the groundwork for a roundtable meeting of experts on landslides. Threats of Landslide in India being real and widespread and in view of the resulting landslide disasters getting more frequent and devastating, especially because of poorly regulated urbanization, climate change and violence against Nature; INAE Forum on Engineering Interventions in Disaster Mitigation in consultation with major stakeholders considered it pertinent to take the initiative of addressing such of those basic issues which are not only critical, but which have eluded apt answers for too long.

Towards this end, the INAE Forum on “Engineering Interventions for Disaster Mitigation” under the Chairmanship of Dr. RK Bhandari, Fellow of INAE and Chairman of the Forum, had organized two roundtable meetings. The first Roundtable meeting on “Landslide Disasters in India -Some Vexing Issues Related to Landslide Control” was organized by the INAE Forum on Engineering Interventions for Disaster Mitigation on Technology Day: 11th May 2015 at Central Road Research Institute, New Delhi. The second Roundtable Meeting on “Engineering Interventions for Landslide Risk Reduction and Mitigation in India” was held on Nov 4, 2015 at Central Road Research Institute (CRRI), New Delhi. Landslide Risk Reduction”. The INAE Forum on Engineering Interventions for Disaster Mitigation which was constituted with the mandate of identifying key areas for disaster risk mitigation and management has recently submitted the recommendations of the Roundtable on “Landslide Risk Reduction” to various concerned agencies including National Disaster Management Authority (NDMA), GSI, Ministry of Earth Sciences etc.

## INAE “Satish Dhawan Chair(s) of Engineering Eminence”

INAE has two Satish Dhawan Chair(s) of Engineering Eminence which were instituted with the objective of enhancing the visibility of the Academy in the policy domain and establishing social connects. Eminent engineers who have contributed to some aspect of nation building are chosen for this esteemed position. Presently, the Satish Dhawan Chairs have been conferred on Dr. K Kasturirangan who is working on “Strategies and Policies for progressing certain important areas of S&T which would have Ramifications with regard to Industrial Development, Socio-economic aspects as well as issues of National Security” and Dr. Anil Kakodkar, who is working on “Sustainable Model for Technology Enabled Development in Rural Areas”.



## Engineering Excellence Awards

### Life Time Contribution Award in Engineering 2015

This award is given to an eminent Indian citizen who has made most distinguished contributions in the field of Engineering / Engineering Research / Technology, which have brought prestige to the nation and regarded as landmarks of technological development of the country.

**Prof. DV Singh**, Former Director, IIT Roorkee and Former Vice-Chancellor, University of Roorkee and **Prof. BL Deekshatulu**, Formerly Director, National Remote Sensing Agency, Hyderabad were conferred Life Time Contribution Awards in Engineering 2015. Prof DV Singh was conferred the award in recognition of his outstanding contributions as a distinguished academician & institution builder and pioneering research work in the areas of Dynamics of Mechanical Systems and Tribology. Prof. BL Deekshatulu was awarded in recognition of his outstanding contributions to research, teaching and development of indigenous cutting edge technologies in the areas of Remote Sensing and Image Processing.

### Prof. Jai Krishna and Prof. SN Mitra Memorial Award, 2015

These awards are given to an eminent engineer, engineer-scientist or a technologist for one or more of the following:

- (a) Academic and scholarly achievements in any discipline of technology
- (b) Outstanding research in engineering and technology and application thereof.
- (c) Outstanding contributions in the management of education and research in engineering
- (d) Outstanding achievements and contributions in the Indian industry, engineering services or engineering projects

Prof Jai Krishna Memorial Award is given from among the disciplines of Engineering Section I (Civil Engineering), Engineering Section III (Mechanical Engineering), Engineering Section IV (Chemical Engineering), Engineering Section VII (Aerospace Engineering) and Engineering Section VIII (Mining, Metallurgical and Materials Engineering). Prof S N Mitra Memorial Award is given from among the disciplines of Engineering Section II (Computer Engineering and Information Technology), Engineering Section V (Electrical Engineering), Engineering Section VI (Electronics & Communication Engineering), Engineering Section IX (Energy Engineering) and Engineering Section X (Interdisciplinary Engineering and Special Fields).

**Dr. LK Singhal**, Director, JSL Ltd, Hisar was conferred the Prof. Jai Krishna Memorial Award 2015 in recognition of his outstanding R&D efforts in the field of Metallurgy leading to indigenization of several special grade steels and growth of the steel industry in the country. **Prof. Sankar K Pal**, DAE Raja Ramanna Fellow, Distinguished Scientist and Former Director, Indian Statistical Institute, Kolkata was conferred the Prof. SN Mitra Memorial Award 2015 in recognition of his fundamental contributions in developing fuzzy set theory and pioneering interdisciplinary research in pattern recognition, machine intelligence and data mining.

## INAE Outstanding Teachers Award, 2015

The Academy has instituted the “Outstanding Engineering Teachers Award” in the year 2013 to honour INAE Fellows who have excelled in the field of teaching in Indian colleges, universities, and institutions, and have provided guidance and inspired students to take up careers in Engineering and Technology. Two such awards are given per year with one award in each group as under.

Group-1 - covering Engineering Section I (Civil Engineering), Engineering Section III (Mechanical Engineering), Engineering Section IV (Chemical Engineering), Engineering Section VII (Aerospace Engineering) and Engineering Section VIII (Mining, Metallurgical and Materials Engineering).

Group-2 - covering Engineering Section II (Computer Engineering and Information Technology), Engineering Section V (Electrical Engineering), Engineering Section VI (Electronics & Communication Engineering), Engineering Section IX (Energy Engineering) and Engineering Section X (Interdisciplinary Engineering and Special Fields).

**Prof Dipak Mazumdar**, Ministry of Steel Chair Professor, Indian Institute of Technology Kanpur and **Prof Kripa Shanker**, Emeritus Fellow, Indian Institute of Technology Kanpur were conferred the INAE Outstanding Teachers Award 2015. Prof Dipak Mazumdar was awarded in recognition of his outstanding contributions in teaching and research in the area of Metallurgy and providing consultancy to steel and refractory industries in the country whereas Prof Kripa Shanker was conferred the award in recognition of his influential teaching in the areas of Manufacturing Systems and Management and contributions to the growth of engineering education in the country.

## INAE Young Engineer Awards, 2015

The Academy instituted INAE Young Engineer Awards in 1996, to recognize excellence in design and technology transfer, innovative development and engineering research. The scheme has attracted nominations of bright young talent in the country and has become a prestigious national award since then. So far, 198 young engineers have been conferred this award and their early recognition has encouraged the best upcoming talent to make innovative engineering and technological contributions for our national development. The nominations for INAE Young Engineer Award for the year 2015 were sought from INAE Fellowship, Engineering institutions, R&D Labs. Out of 129 nominations, 36 were shortlisted by the Sectional Committees. The shortlisted candidates gave presentation of their work before the Selection Committee on Aug 20, 2015 at New Delhi.

The following ten candidates conferred INAE Young Engineer Award 2015.

- 1 Dr. Abhishek Kumar, Assistant Professor, Department of Civil Engineering, IIT Guwahati,
- 2 Dr. Arvind Pattamatta, Assistant Professor, Department of Mechanical Engineering, IIT Madras, Chennai
- 3 Dr. Arindrajit Chowdhury, Assistant Professor, Mechanical Engineering Department, IIT Bombay, Mumbai.
- 4 Dr. Suryasarathi Bose, Assistant Professor, Polymer Processing Group, Department of Materials Engineering, Indian Institute of Science, Bangalore
- 5 Dr. KVM Krishna, Scientific Officer E, MSD, Mod Lab, BARC, Mumbai





- 6 Dr. Deepak Padmanabhan, Researcher, IBM Research - India, Bangalore
- 7 Dr. Gurunath Gurralla, Assistant Professor, Department of Electrical Engineering, Indian Institute of Science, Bangalore
- 8 Mr. Jasbir Singh, Product Architect, Texas Instruments India, Bangalore
- 9 Dr. Mohanasanakar Sivaparkasam, Assistant Professor, Department of Electrical Engineering, IIT Madras, Chennai.
- 10 Dr. VV Raghvendra Sai, Assistant Professor, Biomedical Engineering, Department of Applied Mechanics, IIT Madras, Chennai.

### **Innovative Student Projects Awards, 2015**

The Academy has instituted Innovative Students Projects Award since 1998 to identify innovative and creative projects undertaken by the students at three levels B.E./ B. Tech, M.E/ M.Tech and PhD in engineering colleges. This Award recognizes innovative and creative projects and theses of students and research scholars in engineering institutions, since an early recognition of merit and talent can often mark the beginning of a brilliant career.

A total 97 nominations received (23 at Doctoral level; 37 at Master's level and 37 at Bachelor level) were examined by the Selection Committee. Out of these, 41 nominations (12 at Doctoral level; 11 at Master's level and 18 at Bachelor level) were shortlisted for presentations of their work before the Selection Committee. Five candidates at Doctoral level, five at Master's level and eight at Bachelor level were selected by the Selection Committee for conferment of Innovative Student Projects Awards 2015 as given below.

#### **Doctoral Level**

- 1 Dr Jagadish Vengala, BMS College of Engineering, Bangalore (*Seismic Response Study of Bamboo Based Constructions*)
- 2 Dr Vaibhav Singhal, Indian Institute of Technology Kanpur (*Effect of Toothing and Openings on Bi-directional Seismic Behaviour of Confined Masonry Walls*)
- 3 Dr P Chandrasekhar, Indian Institute of Technology Delhi (*Design of Smart Controllers for Active Distribution Systems*)
- 4 Dr Arnab Hazra, Indian Institute of Engineering Science and Technology, Shibpur (*Development of  $p$  and  $n$  Type  $TiO_2$  Nanostructure Based Devices for Alcohol Sensing*)
- 5 Dr Sreekanth Mandati, Indian Institute of Technology Hyderabad (*Fabrication of  $CuInSe_2$  and  $Cu(In,Ga)Se_2$  Absorber Layers by Pulse and Pulse-reverse Electrochemical Techniques for Solar Photovoltaic Applications*)

#### **Master's Level**

- 1 Mr Vignesh S., Sri Venkateswara College of Engineering, Sriperumbudur (*Design of Robotic Manipulator Using Magnetorheological Fluids for Handling Soft and Fragile Objects*)
- 2 Mr Siddhartha Moulik, Indian Institute of Chemical Technology, Hyderabad (*Hydrodynamic Simulation and Molecular Modeling of Membrane Processes for Solving Challenging Separation Problems*)
- 3 Ms Shital Yadav, Indian Institute of Technology Hyderabad (*Polymer submicron - and Nano-Fibers Applications in healthcare, drug delivery, Oil Spill Remediation and Print Transfer technique*)

- 4 Ms Meenakshi Sarkar, CSIR Central Mechanical Engineering Research Institute, Durgapur (*Design of Robust Controller to Achieve Optimal performance of Autonomous Vehicles*)
- 5 Mr Sayan Dey, Jadavpur University, Kolkata (*Porous Nickel (III) Oxide Nanostructures: Study of its Defects by Positron Annihilation Technique and its Environmental and Electronic Applications*)

### **Bachelor Level**

- 1 Mr Srimathan S, Mr Srinivasaprasad S and Mr Subash G, Sri Venkateswara College of Engineering, Sriperumbudur (*Turmeric Harvester as a Tractor Attachment*)
- 2 Mr G Vignesh and Mr S Aakash, St Josephs College of Engineering, Chennai (*Design and Development of 3D Printer*)
- 3 Mr R Solomon Jeshur Raja and Mr AV Vamsi Krishna, St Joseph's College of Engineering, Chennai (*Effect of Dynamically Controlled Reflectors on the Performance of Solar Panels*)
- 4 Mr D Vinod, Mr Ankit Murarka and Mr Sri Satya Teja, SRM University, Kancheepuram (TN) (*Low Cost Single Character Braille Display Setup for Deaf-Blind*)
- 5 Mr Syed Ghazi Sarwat, PSG College of Technology, Coimbatore (*Advance Microscopy and Modeling of Energy Materials*)
- 6 Ms T Ramya, Mahatma Gandhi Institute of Technology, Hyderabad (*Creep Damage Evaluation of DS CM247 Nickel Base Superalloy Using ACPD Technique*)
- 7 Ms Ramashree T and Ms Sajini R, Sri Venkateswara College of Engineering, Sriperumbudur (*PCR Amplification of TEM Gene of ESBL Escherichia Coli From soil Samples*)
- 8 Mr Jothivanan E and Mr Vamsi Bharadwaj YV, St Josephs College of Engineering, Chennai (*Dy Agram (Beta) - A Unique DNA Based Ink and Hologram for Authentication Security*)



## Joint Schemes with AICTE

### AICTE-INAE Distinguished Visiting Professorship Scheme

The symbiotic relationship between the industry and the academic institutions of engineering and technology in India is weak. On numerous occasions in many a forum, concerns have been expressed on the lack of strong and active linkages between the engineering institutions and the world of work represented by industry, service sector and R&D organizations. This isolation of the engineering institutions at large deprives the graduating engineers of the tangible benefits they can derive from the industry-institution interaction. An exposure to the milieu of the world of work can provide greater maturity to graduating engineers, prepare them better to enter into profession with more confidence and also equip them better to succeed early and become big achievers.

Technology developed through academic and R&D institutions generally falls short of the needs of the industry for design and manufacture of new products and for engineering services to meet the demands of the customers and challenges of market competition. This gap can be narrowed down through a coordinated approach ensuring closer interactions among industry, R&D institutions and the academia, through institutionalized mechanisms. Active programmes should be established for regular visits of experts from industry to address students and academic staff.

The Indian National Academy of Engineering (INAE) launched a Distinguished Visiting Professorship (DVP) Scheme jointly with AICTE in 1999. The Scheme envisages promotion of industry-institute interaction by facilitating the dissemination of knowledge through the expertise of experienced and knowledgeable persons from industry to integrate their rich industrial experience with technical education. The Scheme has received very enthusiastic response from industry and engineering research institutions over the years. Thirteen Industry Experts were selected during the year 2000; eighteen each in 2001 and 2002; fourteen in 2003; ten in 2004; thirteen in 2005; fifteen during the year 2006, fifteen during 2007; eleven during 2008; eighteen during the year 2009; nine during the year 2010, seven during the year 2011; twelve during the year 2012; fourteen during the year 2013 and twelve during the year 2014 by a high level Steering Committee of experts from Academia, Industry and representatives from AICTE and CII.

The continuation of tenure or otherwise, in the subject scheme, is decided by the Steering Committee each year, based on the active contributions of the concerned industry experts and the feedback received from the affiliated engineering college/institution. The maximum tenure will, however, be 5 years.

The scheme has been running successfully and has received good response from industry as well as engineering colleges/institutions. The success of the scheme is largely attributed to active participation of experts from renowned industries like Bharat Heavy Electricals Ltd, TATA Steel, Ericsson, MOOG India Technology Centre, Larsen & Toubro Ltd., Institute for Steel Development & Growth, Tata Research Development & Design Centre, Aditya Birla Group (Cement Division), UltraTech Cement Ltd., etc

There is a constant endeavour to improve and strengthen the functioning of the scheme for which suggestions/views are sought from the industry experts as well as affiliated engineering colleges/ institutions through a Feedback Report after each visit by the industry expert. Positive feedbacks have been received

and some of the representative feedbacks from engineering colleges/institutions associated with this scheme are given below:

- a. *"According to the feedback from the engineering institute the lectures are extremely useful for the students for enriching industry based technological know-how."* Faculty Coordinator, Jadavpur University, Kolkata
- b. *"The scheme is excellent which helps academicians to work on problems with practical and industrial relevance. It also gives a great opportunity to fine tune existing curriculum and introduce new courses to cater the need of industry".* Faculty Coordinator, Department of Metallurgical Engineering, JNTU, Hyderabad
- c. *"The lectures by Industry Expert were on recent advances in the subject that identified many research opportunities."* Faculty Coordinator, Mahatma Gandhi Institute of Technology Hyderabad
- d. *"The lectures delivered by the industry expert gave exposure to the students in the advances in the field of Communications and Frequency Spectrum".* Faculty coordinator, BK Birla Institute of Engineering & Technology, Pilani
- e. *"It is an excellent scheme. It gives an opportunity for the visiting industry expert to share his expertise with academic experts and helps academicians to work on problems with practical and industrial relevance. It also helps post graduate and doctoral students to interact with industry expert and get exposure to industrial problems. It also helps to fine tune existing curriculum and introduce new courses".* Faculty Coordinator, Indian Institute of Engineering Science and Technology, Shibpur

The Steering Committee during its meeting on June 4, 2015, selected the following three industry experts for the year 2015-16:

1. Dr. Yogananda Jeppu  
*Head, R&D systems, MOOG India Technology Centre, Bangalore*
2. Mr. Yogeshchandra S. Trivedi  
*Executive Vice President & Member of Board, L&T Heavy Engineering*
3. Dr. U. Kamachi Mudali  
*FNAE, Outstanding Scientist & Associate Director, Indira Gandhi Centre for Atomic Research (IGCAR)*

The Steering Committee also approved the extension of the following existing 39 Industry Experts for one year i.e. up to May 31, 2016.

1. Dr Vikas Kumar  
*Scientist 'G', Defence Metallurgical Research Laboratory (DMRL), Kanchanbagh, Hyderabad*
2. Mr Ramamurthy Natarajan  
*Senior vice-President- Technology Centre, Tube Investments of India, Chennai*
3. Dr Jayanta Kumar Saha  
*Deputy General Manager (Applications), Institute for Steel Development & Growth, Kolkata*
4. Dr Konatala Srinivasa Rao  
*Scientist 'G' and Director of Project Monitoring for Missiles and Strategic Systems cluster, DRDO, Hyderabad*
5. Dr P Sriram  
*Chairman, Rapsri Engineering Industries Ltd., Haroballi, Karnataka*



6. Dr BC Pai  
*CSIR Emeritus Scientist, CSIR, National Institute for Interdisciplinary Science and Technology (NIIST), Tiruvanthapuram*
7. Dr Chaitanyamoy Ganguly, FNAE  
*Retired Distinguished Scientist, DAE*
8. Mr P Jayasimha  
*General Manager (Retired) HAL, Bangalore*
9. Dr S Kishore Kumar  
*Scientist 'G', Associate Director of Turbomachinery Design and Programme Director of Gas Turbine Enabling Technology*
10. Dr Manish Roy  
*Scientist 'F', Defence Metallurgical Research Laboratory, Hyderabad*
11. Prof Mahesh C Tandon, FNAE  
*Managing Director, Tandon Consultants Pvt. Ltd., New Delhi*
12. Prof Barada Kanta Mishra, FNAE  
*Director, CSIR – Institute of Minerals & Materials Technology (IMMT), Bhubaneswar*
13. Mr DP Misra, FNAE  
*Director, Indian Chemical Council, Mumbai*
14. Dr Ramamurthy Badrinath  
*Computer Systems Architect, Hewlett Packard (HP), Bangalore*
15. Dr Venkataramana Runkana  
*Principal Scientist, Tata Research Development and Design Centre, Pune*
16. Dr Ranjan Sen  
*Chief Scientist, CSIR-Central Mechanical Engineering Research Institute (CMERI), Durgapur*
17. Dr S Suresh  
*Consultant, Bharat Heavy Electricals Ltd (BHEL), Tiruchirapalli*
18. Dr Namburi Eswara Prasad  
*Scientist 'G' and Regional Director, Regional Centre for Military Airworthiness (Materials), DRDO, Hyderabad*
19. Dr Poonam Ahluwalia  
*Consultant, World Bank*
20. Dr. PC Jain  
*Scientist 'F' and Head Structures, Defence Research and Development Laboratory, Hyderabad*
21. Dr R Selvaraj  
*Head Civil Engineering Division, Central Electrochemical Research Institute (CECRI), Karaikudi*
22. Dr G Raja Singh Thangadurai  
*Scientist 'G', Program PJ-10, Defence Research Development Laboratory, Hyderabad*



23. Dr PS Ramkumar  
*Director, Applied Cognition Systems Pvt Ltd, Bangalore*
24. Dr SK Singal  
*Professor & Chief Scientist, Indian Institute of Petroleum, Dehradun*
25. Dr Shashi Bhushan Singh  
*Director, Institute of Technology Management, DRDO, Mussoorie*
26. Mr S Madivaanan,  
*Formerly Additional Director, Combat Vehicles Research & Development Establishment (CVRDE), DRDO*
27. Dr V Ramachandra  
*Vice-President (Technical Services), UltraTech Cement Ltd.*
28. Mr KN Suryanarayana Rao  
*Formerly Engineer -H, Project Director, IRNSS, ISRO, Bangalore*
29. Dr Surendra Pal, FNAE  
*Senior Advisor-Navigation, ISRO, Prof. Satish Dhawan Professor, ISRO, Bangalore*
30. Dr SK Kaushik, FNAE  
*Consulting Structural Engineer, Beas (Punjab)*
31. Mr Paritosh C Tyagi, FNAE  
*Consultant in Environmental Management, NOIDA*
32. Dr Kamalesh Dasgupta  
*Outstanding Scientist, Head Tunable Laser Section, BARC, Mumbai*
33. Dr Madhu Ganesh  
*Director, Technical, Reneo Energy Systems, Coimbatore*
34. Dr MR Kalgai  
*Senior Vice-President, UltraTech Cement Ltd., Bangalore*
35. Mr RP Ritolia  
*Advisor (Coal) to MD, Tata Steel and Formerly CMD, Central Coalfields Ltd.*
36. Dr N Rama Murthy  
*Scientist 'G', Additional Director, Centre for Artificial Intelligence and Robotics (CAIR), Bangalore*
37. Dr Bishwajit Chakraborty  
*Scientist 'G'/Chief Scientist, National Institute of Oceanography, Goa*
38. Dr Arya Kumar Bhattacharya  
*Head, Intelligent Systems and Mathematical Modeling, Tata Steel, Jamshedpur*
39. Dr Shantanu Chakrabarti  
*Formerly, Head, Research Applications, Tata Steel R&D, Jamshedpur*



## AICTE-INAE Teachers Research Fellowship Scheme

Indian National Academy of Engineering (INAE) launched AICTE-INAE Teachers Research Fellowship Scheme jointly with AICTE, for Engineering Teachers to pursue Doctoral Research in Central Laboratories in order to promote a research culture amongst the faculty in AICTE approved engineering institutions. Under this scheme, engineering teachers in AICTE approved engineering colleges/institutions are sponsored to pursue research in Council of Scientific and Industrial Research (CSIR)/ Defence Research and Development Organization (DRDO)/ Department of Space (DoS)/ Department of Atomic Energy (DAE) laboratories leading to the award of a Ph.D degree in the chosen field of study. The Ph.D degree will be awarded by the concerned organizations of CSIR, DRDO, DoS and DAE.

A Steering Committee of the experts from AICTE, INAE, CII, CSIR, DRDO, DOS and DAE has been constituted. The guidelines for operation and implementation of the AICTE-INAE TRF Scheme were prepared by the Committee and approved by AICTE. The disciplines of engineering in which Ph.D programmes can be offered and maximum number of candidates which can be accommodated in their laboratories during the each academic session of the proposed scheme are intimated by CSIR/DRDO/DoS/DAE. The applications received from the eligible engineering teachers to pursue the PhD programme are scrutinized by the Steering Committee and suitable candidates are recommended to CSIR/DRDO/DoS/DAE for allocation of a lab and guide. On finalization of this, the selected candidates are offered admission in the concerned lab.

The following candidates have been selected to undertake PhD programme:

| S. No. | Name                      | Engineering College / Institute                                         | Specialization                                      | Lab & Location       |
|--------|---------------------------|-------------------------------------------------------------------------|-----------------------------------------------------|----------------------|
| 1      | Mr. Arnab Kundu           | Birbhum Institute of Engineering and Technology, Birbhum                | Mobile Communication & Network Technology           | CSIR-CMERI Durgapur  |
| 2      | Ms. Debasri Chakraborty   | Birbhum Institute of Engineering and Technology, Birbhum                | Geographic Information System                       | CSIR-CMERI Durgapur  |
| 3      | Mr. Mukund Arun Patil     | GH Rasoni Institute of Engineering and Management, Jalgaon, Maharashtra | Mechanical Engineering                              | CSIR-CMERI Durgapur  |
| 4      | Mr. BS Somesh             | Reva Institute of Technology and Management, Bangalore                  | Simulation and Modeling in Signal Processing Domain | CSIR-CMERI Durgapur  |
| 5      | Ms. M Shireesha           | Anurag Group of Institution, Ranga Reddy Distt., (AP)                   | Chemical Engineering                                | CSIR-IICT Hyderabad  |
| 6      | Mr. Jangiti Siva Prasanth | Anurag Group of Institution, Ranga Reddy Distt., (AP)                   | Information Security                                | CSIR-IICT, Hyderabad |

|    |                             |                                                                  |                                                            |                         |
|----|-----------------------------|------------------------------------------------------------------|------------------------------------------------------------|-------------------------|
| 7  | Mr. Amit Naik               | Shri GS Institute of Technology & Science                        | Electronics and Communication                              | DRDO-DIAT, Pune         |
| 8  | Mr. Shreevyas HM            | Government Engineering College, Karwar                           | Communication Engineering                                  | DRDO-CAIR, Bangalore    |
| 9  | Ms. Beneyaz Ara Begum       | Silicon Institute of Technology, Bhubaneswar                     | Distributed Data Sharing Services (loosely coupled domain) | CSIR-IICT, Hyderabad    |
| 10 | Mr. Swagat Kumar Samantaray | National Institute of Science & Technology, Berhampur, Odisha    | Low Power Microcontroller & Robotics                       | CSIR-CSIO, Chandigarh   |
| 11 | Ms. Sangeeta Bagha          | Silicon Institute of Technology, Bhubaneswar                     | Biomedical Instrumentation                                 | CSIR- IMMT, Bhubaneswar |
| 12 | Mr. Mukesh Kumar Sukla      | National Institute of Science & Technology, Berhampur, Odisha    | VLSI                                                       | DRDO-ANURAG, Hyderabad  |
| 13 | Mr. RS Mohan Kumar          | Coimbatore Institute of Technology, Coimbatore                   | Control Engineering                                        | DOS-IIST, Trivandrum    |
| 14 | Mr. Lingaraj Ashok Hadimani | KLE Dr. MS Sheshgiri College of Engineering & Technology, Belgum | Computer Science and Engineering                           | CSIR-CSIO, Chandigarh   |
| 15 | Ms. Monica Ravishankar      | REVA Institute of Technology and Management, Bangalore           | Software Engineering                                       | DRDO-DIAT, Pune         |
| 16 | Ms. Madhusmita Das          | Institute of Technical Education & Research, Bhubaneswar         | Security/Steganography                                     | DAE- VECC, Kolkata      |
| 17 | Mr. Binayak Pattanayak      | Institute of Technical Education & Research, Bhubaneswar         | Thermal Engineering                                        | CSIR-IMMT, Bhubaneswar  |
| 18 | Mr. Satya Prakash Rout      | Institute of Technical Education & Research, Bhubaneswar         | Heat Power                                                 | CSIR-IMMT, Bhubaneswar  |
| 19 | Mr. Mrutyunjaya Sahani      | Institute of Technical Education & Research, Bhubaneswar         | Embedded System Technology                                 | CSIR-IMMT, Bhubaneswar  |



## AICTE-INAE Travel Grant Scheme for Engineering Students

Indian National Academy of Engineering (INAE) launched AICTE-INAE Travel Grant Scheme for Engineering Students jointly with AICTE during 2013 to provide financial support for engineering students to present papers abroad. The objective of the scheme is to provide partial travel assistance and registration fees to Bachelors and Masters Level engineering students for presenting a research paper in an international scientific event (conference/ seminar/ symposium/ workshop etc) in order to encourage engineering students to engage in research.

Third/Fourth year B.E./B.Tech; First/Second year M.E./M.Tech; or Fourth/Fifth year Integrated M.Tech Level engineering students from AICTE approved Engineering institutions are eligible under the scheme. The applicant should have an invitation for presenting a research paper which has been accepted in a conference /seminar /symposium /workshop abroad. The Selection Committee comprising of Advisor, AICTE; Head, Higher Education, CII and experts from each of the ten engineering sections of INAE has been constituted. The scheme is running quite satisfactorily.

Reimbursement of 100% Registration and Visa Fee, 50% of the actual Airfare for discounted/concessional air tickets and actual fare not exceeding AC II Class train fare will be admissible for travel from the Engineering College/ Institution to the nearest airport and back. Maximum financial support per student towards registration, concessional travel expenditure and visa fees, is limited to Rs. 1 lakh.

The details of the students selected under this scheme are given below:

| S. No | Name                  | Approved in | Engineering College/ Institution      | Title of the Paper                                                                                         | Name of the Event, Date & Venue                                                                           |
|-------|-----------------------|-------------|---------------------------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| 1     | Mr. Lalith Nag Sharan | Oct 2013    | Manipal Inst. Of Tech, Manipal B Tech | A systemic Approach to Peripheral Temperature Monitoring and its Biomedical Applications                   | 15 <sup>th</sup> International Conference on Biomedical Engineering on Dec 4-7, 2013 at Singapore         |
| 2     | Mr. Shreyas BS        | Oct 2013    | MSRIT, Bangalore                      | An Intelligent System to Detect, Avoid and Maintain Potholes : A Graph Theoretic Approach                  | 7th International Conference on Mobile Computing and Ubiquitous Networking on Jan 6 – 8 2014 at Singapore |
| 3     | Mr. Raffi Mohammed    | Nov 2013    | Andhra University, Vishakapatnam      | Effect of Welding Processes on Microstructure and Corrosion Behaviour of Aluminium Alloy AA 2219-T87 Welds | 1st International Conference on Welding and Non-Destructive Testing on Feb 25-26, 2014 at Karaj, Iran     |

|    |                          |          |                         |                                                                                                                         |                                                                                                                           |
|----|--------------------------|----------|-------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| 4  | Mr. Nishanth K Prasad    | Jan 2014 | NMIT, Bangalore         | Ground Based Modeling and Real Time On-Board Calibration of Three Axis Magnetometer                                     | 2014 IEEE Aerospace Conference on Mar 1-8, 2014 at Big Sky, Montana, USA                                                  |
| 5  | Mr. Amir Ahmed           | Feb 2014 | SMIT, Sikkim            | Comparison Between Permanent Magnet Synchronous Motor and Three Phase Induction Motor for Electric Vehicle Applications | 2014 International Conference on Automation Control Theory and Application (ACTA) on Jun 17-19, 2014 at Bangkok, Thailand |
| 6  | Ms. Bhavana KH           | Feb 2014 | NMIT, Bangalore         | Power Generation Unit of Nano-Satellites SUDSAT 2A/2B                                                                   | 10th European Space Power Conf. on Apr 13-17, 2014 at Noordwijkerhout, The Netherlands                                    |
| 7  | Mr. Abhiram Aithal       | Feb 2014 | MSRIT, Bangalore        | Study of Utilization of wind induced Vibrations in Generation of Electricity                                            | 6th Annual IEEE Green Technologies Conference on Apr 3-4, 2014 at Corpus Christi, Texas, USA                              |
| 8  | Ms. Amrita Roy Chowdhury | Mar 2014 | BESU, Shibpur           | LOCHA : A Light-Weight One-way Cryptographic Hash Algorithm for wireless Sensor Network                                 | 5th International Conference on Ambient Systems, Network and Technologies (ANT-2014) on Jun 2-5, 2014 at Hasselt, Belgium |
| 9  | Mr. Manikandan P         | Mar 2014 | PSG College, Coimbatore | Weighted Fuzzy Fault Tolerant Model Predictive Control                                                                  | 2014 IEEE International Conference on Fuzzy Systems on Jul 6-11, 2014 at Beijing, China                                   |
| 10 | Mr. JP Mishra            | Mar 2014 | College of Engg. Pune   | Levant Differentiator Based Output-Feedback Control for SLOSH Suppression using super-Twisting Algorithm                | 26th Chinese Control and Decision Conference on May 31- Jun 2, 2014 at Changsha, China                                    |





|    |                            |          |                                                                 |                                                                                                      |                                                                                                                         |
|----|----------------------------|----------|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| 11 | Mr. Abhilash M             | Apr 2014 | NMIT, Bangalore                                                 | Implementation of the MEMS-Based Dual-Axis Sun Sensor for Nano Satellites                            | IEEE International Workshop on Metrology for Aerospace 2014 on May 29-30, 2014 at Benevento, Italy                      |
| 12 | Mr. B. K. Murugan          | Apr 2014 | Amrita School of Engineering, Coimbatore                        | Friction Surfacing as a Replacement for Fusion Cladding of Monel over steels for Marine Applications | FISITA World Automotive Congress – Student Congress on Jun 2-6, 2014 at The Netherlands                                 |
| 13 | Mr. R. Rishikesh           | May 2014 | Kongu Engineering College, Perundurai, Tamil Nadu               | Fuzzy Logic Implementation of Automated Elevator Car Parking in Embedded System                      | International Conference on Recent Trends and Innovations in Science & Technology on Jul 5-6, 2014 at Pattaya, Thailand |
| 14 | Mr. Syam Sujith Maddikonda | May 2014 | Amrita University, Coimbatore                                   | SAR Image Processing using GPU                                                                       | The 40th COSPAR Scientific Assembly on Aug 2-10, 2014 at Moscow, Russia                                                 |
| 15 | Mr. Sourabh Rakhya         | Jul 2014 | Jabalpur Engineering College, Jabalpur                          | RAKHYA'S Method: A Case Based Approach to Solve n-Queens Problem                                     | International Conference on System Theory, Control and Computing ICSTCC on Oct 17-19, 2014 at Romania.                  |
| 16 | Mr. Sanket Kailas Gorade   | Jul 2014 | College of Engineering, Pune                                    | Modeling and Sliding Mode Control of Flexible Structure                                              | 14th International Conference on control, Automation and system (ICCAS 2014) on Oct 22-25, 2014 at Kintex, South Korea  |
| 17 | Ms. Meenakshi S            | Aug 2014 | Sri Shakthi Institute of Engineering and Technology, Coimbatore | Electromagnetic Radiation Shielding.                                                                 | 30th Meeting of American society for gravitational and space research on Oct 22-26, 2014 at Pasadena, California        |

|    |                             |          |                                               |                                                                                                                                   |                                                                                                                                                                                                         |
|----|-----------------------------|----------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 18 | Mr. Binu KR                 | Aug 2014 | Manipal Institute of Technology, Manipal      | Baseline studies of major ions and heavy metals in a large tropical river, southwestern India                                     | 11th International Symposium on Recent Advances in Environmental Health Research and the 13th International Symposium on Metalions in Biology and Medicine on Sep 14-18, 2014 at Pascagoula Street, USA |
| 19 | Ms. Debashree De            | Sep 2014 | Jadavpur University, Kolkata                  | Implementation and value creation of Green Productivity by Green Supply Chain Management                                          | 2nd International Conference on Advances in Civil, Structural and Mechanical Engineering - CSM 2014, on Nov 16-17, 2014 at University of Birmingham, UK                                                 |
| 20 | Mr. Syed Ghazi Sarwat       | Sep 2014 | PSG College of Technology, Coimbatore         | Identification of easy glass forming Mg-Zn-Ca-X (Y, Fe, Mn, Sr) compositions for biomedical applications.                         | Materials Today Asia 2014 on Dec 9-12, 2014 at City University of Hong Kong, Hong Kong                                                                                                                  |
| 21 | Mr. Pranjal K Naik          | Oct 2014 | College of Engineering Pune                   | Design and Optimization of the structure of a IU Picosatelite                                                                     | 28th Space Simulation Conference on Nov 3-6, 2014 at Maryland, USA                                                                                                                                      |
| 22 | Mr. Shramanth R Rajarathnam | Nov 2014 | MS Ramaiah Institute of Technology, Bangalore | Experimental and Mathematical Analysis of Biofuel (CNSL blended with Diesel) Run Diesel Engine                                    | The 2nd IEEE Conference on Power Engineering and Renewable Energy (ICPERE 2014), on Dec 9-11, 2014 at Bali, Indonesia                                                                                   |
| 23 | Mr. Kishor S, Gaikwad       | Dec-14   | College of Engineering, Pune                  | 1. Solar Flower System for Residential Loads<br>2. Novel maximum power point tracking (MPPT) Algorithm for Solar Tree Application | 5th International Youth Conference on Energy 2015 on May 27-30, 2015 at Pisa Italy                                                                                                                      |



|    |                              |         |                                                                          |                                                                                           |                                                                                                                                          |
|----|------------------------------|---------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| 24 | Mr. Vinayak Kaushal, B.Tech  | Jan -15 | JN Govt. Engg College, Sundernagar (H.P)                                 | Influence of Jute Fibres on the Unconfined and compressive Strength of Alkaline Soil      | International Conference on Materials Engineering (ICMEN2015) on May 9-10, 2015 at Bangkok, Thailand                                     |
| 25 | Mr. Nilavra Bhattacharya     |         | IIST, Shibpur                                                            | Fractal Image Compression Using Hierarchical Classification Of Sub-Images.                | VISAAP - 2015- 10th International Conference on Computer Vision on Mar 11-14, 2015 at Berlin, Germany.                                   |
| 26 | Mr. Shikher S Bhandary       |         | MS Ramaiah Institute of Technology, Bangalore                            | Experimental study of a biofuel engine and its validation through mathematical modelling. | The Energy and Materials Research Conference (EMR2015) on Feb 25-27, 2015 at Madrid, Spain                                               |
| 27 | Mr. Arpan Sen                |         | Indian Institute of Engineering Science & Technology, Shibpur            | Achieving Data Survivability and Confidentiality in Unattended Wireless Sensor Networks.  | The 29th IEEE International conference on Advanced Information Networking & application (AINA-2015) on Mar 24-27, 2015 at Gwangju, Korea |
| 28 | Mr. Santosh Kumar Chaturvedi |         | Sardar Patel College of Engineering, Mumbai                              | Maglev Wind Generator: An efficient form of vertical axis wind turbine.                   | The 6th International Renewable Energy Congress (IREC 2015) on Mar 24-26, 2015 at Sousse, Tunisia, Africa                                |
| 29 | Mr. Dudul Das                |         | Tezpur University, Assam                                                 | Solar Still Absorber Plate Modification and Exergy Analysis                               | ICRERA 2015 : International Conference on Renewable Energy Researches and Applications on July 20-21, 2015 at Paris, France              |
| 30 | Mr. Shubham Jain             |         | Swami Vivekanand Institute of Technology, Management & Gramothan, Jaipur | A Force-Controlled Portrait Drawing Robot                                                 | 2015 IEEE International Conference on Industrial technology (ICIT2015) on Mar 17-19, 2015 at Seville, Spain                              |

|    |                              |            |                                                                      |                                                                                                        |                                                                                                                                                                      |
|----|------------------------------|------------|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 31 | Ms. Mrudul B. Patwardhan     | March 2015 | College of Engineering Pune                                          | An Image Processing Approach for Mathematical Modeling of Flexible Structure.                          | The 10th Asian Control Conference 2015 (ASCC 2015) on May 31-June 3, 2015 at Kota Kinabalu, Malaysia                                                                 |
| 32 | Ms. Ridhu H Nair             | March 2015 | School of Engineering, Amrita Vishwa Vidyapeetham, Coimbatore        | A simplified approach to identify the fetal ECG from abdECG and to measure fHR                         | World Association for Chinese Biomedical Engineers on July 6-8, 2015 at National University of Singapore, Singapore                                                  |
| 33 | Mr. Dudul Das                | April 2015 | Tezpur University, Assam                                             | Design of Solar Still Absorber Plate Performance Evaluation and Theoretical Analysis                   | 2015 International Conference on Alternative Energy in Developing Countries and Emerging Economies (2015 AEDCEE), on May 28-29, 2015 at Bangkok, Thailand            |
| 34 | Ms. Saranya Devi Subramaniam | April 2015 | Amrita School of Engineering, Amrita Vishwa Vidyapeetham, Coimbatore | Retinal vasculature segmentation in smartphone ophthalmoscope retinal images                           | 7th WACBE World Congress on Bioengineering on July 6-8, 2015 at Singapore.                                                                                           |
| 35 | Mr. Jaypal Jagdish Baviskar  | May 2015   | Veermata Jijabai Technological Institute Mumbai                      | Performance Analysis of Uniform Metamaterial Lens Embedded Patch Antennas                              | 2015 IEEE International Symposium on Antennas and Propagation and North American Radio Science Meeting AP-S/URSI 2015 on Jul 19-25, 2015 at British Columbia, Canada |
| 36 | Mr. Neelanjan Dutta          | May 2015   | Indian Institute of Engineering Science & Technology, Shibpur        | Field Application of Electrocoagulation for Arsenic Removal from Groundwater Supplies                  | OU International Water Conference on Sep 21-23, 2015 at Norman, Okla., U.S.A                                                                                         |
| 37 | Ms. Rinita Roy               | May 2015   | Future School of Engineering and Management, Kolkata                 | Optimization of Stego Image retaining secret information using Genetic Algorithm with 8-connected PSNR | 19 <sup>th</sup> International Conference on Knowledge-Based and Intelligent Information & Engineering Systems 2015, on 7-9 Sep, 2015 at Singapore                   |



|    |                                      |          |                                             |                                                                                                                           |                                                                                                                                 |
|----|--------------------------------------|----------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| 38 | Mr. Syed Nazishuddin Quadri F        | Jun 2015 | College of Engineering, Pune                | IEOM International Conference on Operations Excellence and Service Engineering on Sep10-11, 2015 at Orlando, Florida, USA | Design and Fabrication of Automated Loading Trolley for Missile and Canister                                                    |
| 39 | Mr. Abdulhussain Quresh Songerwala   | Jul 2015 | College of Engineering, Pune                | 66th International Astronautical Congress - 2015 on Oct 12-16, 2015 at Jerusalem, Israel                                  | Design and implementation of a custom Transceiver to Establish Digital Communication with Satellites in Ham Band                |
| 40 | Mr. Dhaval Vilas Waghulde            | Jul 2015 | College of Engineering, Pune                | 66th International Astronautical Congress - 2015 on Oct 12-16, 2015 at Jerusalem, Israel                                  | Qualification Tests and Performance Validation of Power System for Small Satellites                                             |
| 41 | Ms. Bhagyashree Chandrakant Prabhune | Jul 2015 | College of Engineering, Pune                | 66th International Astronautical Congress - 2015 on Oct 12-16, 2015 at Jerusalem, Israel                                  | Prediction and improvement in fatigue life of LEO 1U pico-satellite using FEA tool to maximize the mission's predicted life     |
| 42 | Ms. Sanjana Sahayaraj                | Aug 2015 | SSN College of Engineering, Kalavakkam (TN) | World Congress on Engineering and Computer Science (WCECS 2015) on Oct 21-23, 2015 at San Francisco, USA                  | 1. Knowledge Discovery through Computational Methods on EEG and fMRI Data<br>2. Formal Methods for Business Processes: A Survey |

### INAE Travel Grant Scheme for Engineering Students

Indian National Academy of Engineering (INAE) launched INAE Travel Grant Scheme for Engineering Students during 2014, to present papers abroad with the purpose of enhancing the quality of engineering education in the country. The objective of the scheme is to provide partial travel assistance and registration fees to Bachelors and Masters level engineering students for presenting research paper in an international scientific event (conference/ seminar/ symposium/ workshop/ exhibition etc) in order to encourage engineering students to engage in research.

Third/Fourth year B.E./B.Tech; First/Second year M.E./M.Tech; or Fourth/Fifth year Integrated M.Tech Level engineering students from IITs, NITs, IIITs, IISc and Other Universities are eligible under the scheme. The applicant should have an invitation for presenting a research paper which has been accepted



in a conference /seminar /symposium /workshop abroad. The Selection Committee comprising of experts from each of the ten engineering sections of INAE has been constituted. The scheme is running quite satisfactorily.

Reimbursement of 100% Registration fee and Visa fee, 50% of the actual Airfare for discounted/concessional air tickets and actual fare not exceeding AC II Class train fare will be admissible for travel from the Technical Institution to the nearest airport and back. Maximum financial support per student towards registration, concessional travel expenditure and visa fees, is limited to Rs. 1 lakh.

The details of the students who have been selected under this subject scheme during the year 2015-16 are given below:

| S. No | Name                  | College/ Institution                                  | Title of the Paper                                                                                                                        | Name of the Event, Date & Venue                                                                                                        |
|-------|-----------------------|-------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Mr. Saurabh Kesarwani | Visvesvaraya National Institute of Technology, Nagpur | Polycrystalline Textured large grained Silicon “Seed Layer” by Aluminum Induced Crystallization (AIC) on steel for solar cell application | World Conference and Expo on Nanotechnology and Materials Science on April 13-15, 2015 at Dubai, UAE                                   |
| 2     | Mr. Chirag C Shetty   | Indian Institute of Technology, Bombay                | Live Demonstration: spiking neural circuit based navigation inspired by C. elegans thermotaxis.                                           | IEEE International Symposium on circuits and systems (ISCAS-2015) on May 24-27, 2015 at Lisbon, Portugal                               |
| 3     | Mr. Rohit Parashar    | Indian Institute of Technology, Bombay                | Rapid Synchronization Technique for Enhanced Low Voltage Ride-through Operation of Distributed Energy Resource                            | 9th International Conference on Power Electronics (ICPE-2015)- ECCE-Asia on June 1-5, 2015 at Seoul, Republic of Korea                 |
| 4     | Ms. Vrindaa Somjit    | National Institute of Technology, Tiruchirappally     | First principle calculations of thermophysical and thermochemical properties of Z-phase in steels.                                        | CALPHAD XLIV-International Conference on Computer Coupling of Phase Diagrams and Thermochemistry on May 31-Jun 5, 2015 at Loano, Italy |
| 5     | Mr. Pranav Shetty     | Indian Institute of Technology, Bombay                | (a) Gas Phase Synthesis of One-dimensional Single Crystal Tin Oxide Nanostructured Lithiumion Battery Anodes.                             | 227th Electrochemical Society Meeting on May 24-28, 2015 at Chicago, Illinois, USA                                                     |



|    |                                   |                                        |                                                                                                           |                                                                                                                                                                                    |
|----|-----------------------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |                                   |                                        | (b) Modelling the effects of morphology in Lithium Ion Battery electrodes.                                |                                                                                                                                                                                    |
| 6  | Ms. Shibani Santurkar             | Indian Institute of Technology, Bombay | ELEGANS CHEMOTAXIS inspired neuromorphic circuit for contour tracking and obstacle avoidance              | 2015 IEEE International Joint Conference on Neural Networks (IJCNN2015) on July 12-17, 2015 at Killarney, Ireland                                                                  |
| 7  | Mr. Navin Anwani                  | Indian Institute of Technology, Bombay | NormAD - Normalized Approximate Descent based Supervised Learning Rule for Spiking Neurons                | 2015 IEEE Int. Joint Conf. on Neural Networks (IJCNN2015) on July 12-17, 2015 at Killarney, Ireland                                                                                |
| 8  | Ms. Sukanya Vijaysing Patil       | Indian Institute of Technology, Bombay | Neural Circuits for Touch-Induced Locomotion in Caenorhabditis Elegans                                    | 2015 IEEE International Joint Conference on Neural Networks (IJCNN2015) on July 12-17, 2015 at Killarney, Ireland                                                                  |
| 9  | Ms. Pravallika Vura               | Indian Institute of Technology, Kanpur | Hexagonal Shaped Reciprocal External Cloak With Homogeneous Material Properties.                          | 2015 IEEE International Symposium on Antennas and Propagation and North American Radio Science Meeting (AP-S/URSI 2015) on July 19–25, 2015 at Vancouver, British Columbia, Canada |
| 10 | Ms. Meenakshi Asokan              | Indian Institute of Technology, Madras | A model of learning temporal delays, representative of adaptive myelination.                              | The 24th Annual Computational Neuroscience Conference on July 18-23, 2015 at Prague, Czech Republic                                                                                |
| 11 | Ms. Shivani Shailendra Singh Gour | Indian Institute of Technology, Kanpur | Study of Tension-compression asymmetry in Mg and Mg Alloys Using Viscoplastic Self-Consistent Simulations | 17th International Conference on the Strength of Materials (ICSMA-17) on Aug 9-14, 2015 at Brno, Czech Republic                                                                    |
| 12 | Mr. Nilesh S Bansod               | Indian Institute of Technology, Bombay | Design and Optimization of Power train using Hybrid Planetary Gearbox for Formula Student Vehicle         | ASME 2015 International Design & Engineering Technical Conferences & Computers and Information in Engineering Conference on Aug 2-5, 2015 at Boston, MA, USA                       |

|    |                             |                                           |                                                                                                                                                        |                                                                                                                                                      |
|----|-----------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13 | Mr. Pranav Lad              | Indian Institute of Technology, Bombay    | Dynamics And Stability Of A Travelling String Subjected To An Axial Follower Force                                                                     | ASME 2015 International Mechanical Engineering Congress and Exposition- IMECE 2015 on Nov 13-19, 2015 at Houston, Texas, USA.                        |
| 14 | Mr. Sagar D Joshi           | Indian Institute of Technology, Bombay    | Conceptual Design Of An Active Transtibial Prosthesis Based On Expected Joint And Muscle Forces In A Unilateral Transtibial Amputee: A Modelling Study | ASME 2015 International Mechanical Engineering Congress and Exposition- IMECE 2015 on Nov 13-19, 2015 at Houston, Texas, USA.                        |
| 15 | Mr. Dhawal Rajendra Thakare | Indian Institute of Technology, Madras,   | Ultrasonic guided waves in bone system with degradation                                                                                                | 170th Meeting of Acoustical Society of America (ASA), on Nov 2-6, 2015 at Florida, USA                                                               |
| 16 | Mr. Anuj Mahajan            | Indian Institute of Technology, Delhi     | Lifted Inference Rules with Constraints                                                                                                                | Neural Information Processing Systems 2015 on Dec 7-12, 2015 at Montreal, Canada                                                                     |
| 17 | Mr. Ishan Ankur Patil       | Indian Institute of Technology, Indore    | Assessing Vulnerability of Dorsal Hand-Vein Verification System to Spoofing Attacks using Smartphone Camera                                            | IEEE International Conference on Identity, Security and Behaviour Analysis 2016 on Feb 29, 2016 to March 2, 2016 at Tohoku University, Sendai, Japan |
| 18 | Ms. Manashi Chakraborty     | Indian Institute of Technology, Kharagpur | A New Paradigm of Oral Cancer Detection using Digital Infrared Thermal Imaging                                                                         | SPIE International Symposium on Medical Imaging 2016 on Feb 27, 2016 - March 3, 2016 at California, USA                                              |
| 19 | Ms. Vini Gupta              | Indian Institute of Technology, Kanpur    | SBL-Based Joint Target Imaging and Doppler Frequency Estimation In Monostatic MIMO Radar Systems                                                       | The 41st IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP-2016) on Mar 20-25, 2016 at Shanghai, China                |

## National Competition on Innovations in Manufacturing Practices - 2016 (IMP-2016)

IIT Kanpur, INAE along with the INAE Kanpur Local Chapter organized the national level competition on “**Innovation in Manufacturing Practices 2016**” (IMP-2016) to provide a platform to display and showcase the talent of bright engineering students in design and manufacturing. The event was organized during TECHKRITI 2016 held at IIT Kanpur from 3<sup>rd</sup> March to 6<sup>th</sup> March, 2016. As part of the competition, a team had to design an effective and innovative model and give a final working shape as a product/prototype. Student entries were invited both at under graduate and post graduate level; from different engineering colleges /institutions across the country. The students had to submit an abstract, project description and design and working principle in the form of video. There were about 100 entries at Undergraduate and 16 at Postgraduate level. First, these entries were screened by a committee of Fellows of INAE and faculty members of IIT Kanpur, who shortlisted eight teams for the final presentation at under graduate level and none in post graduate level. IMP 2016 final evaluation was conducted on 4<sup>th</sup> March 2016 with a small inaugural function presided over by the Prof Indranil Manna, Director, IIT Kanpur, in which INAE Kanpur Local Chapter members, Faculty members, students from IIT Kanpur and engineering colleges across the country, staff members and media personnel participated. A committee headed by Prof. Kallol Mondal evaluated the six under graduate projects.

The results of the evaluation are given below.

- 1<sup>st</sup> prize    Green technocrats – generating electricity from to and fro movement of big Hoarding by using wind energies
- 2<sup>nd</sup> prize    Quantum mechanical parts – Integration of multiple motors and generating power in a more efficient manner.
- 3<sup>rd</sup> prize    It was shared with Robo music and internal nano polishing

The prizes were distributed during the Valedictory Session held on the same day. A Feedback was also taken from the participants regarding the competition.



*Internal nano polishing*



*Robo music*



## Events Organized by Local Chapters

### INAE Kanpur Local Chapter

The new Executive Committee of the INAE Kanpur Local Chapter was elected in a General Body Meeting held on 23<sup>rd</sup> February 2015 at IIT Kanpur, consisting of the following members.

|                                                         |                  |
|---------------------------------------------------------|------------------|
| Prof. S.C. Srivastava, Elect. Eng. Dept., IIT Kanpur    | Chairperson      |
| Prof. Sanjay Mittal, Aero. Eng. Dept., IIT Kanpur       | Vice Chairperson |
| Prof. Yogesh Joshi, Chem. Eng. Dept., IIT Kanpur        | Hon. Secretary   |
| Prof. Anindya Chatterjee, Mech. Eng. Dept., IIT Kanpur  | Member           |
| Prof. Monica Katiyar, Mat. Sc. & Eng. Dept., IIT Kanpur | Member           |

During the year 2015-16, four meetings of the Executive Committee took place. The INAE Kanpur local chapter organized five seminars, delivered by eminent speakers, celebrated Engineers Day with IE(I) and IETE Kanpur local Chapters, and co-organized the National Competition on Innovations in Manufacturing Practices-2016 (IMP-2016) with INAE Headquarters and IIT Kanpur. In addition, the Chapter also jointly felicitated two of the INAE Fellows/Young Engineer Awardee for their distinct recognition.

The details of various activities are listed below.

#### 1. Felicitations Ceremony by the Chapter

- INAE Kanpur Local Chapter, along with Department of Computer Science and Engineering IIT Kanpur and Indian National Science Academy (INSA) Kanpur Local Chapter, felicitated Prof. Manindra Agrawal, FNAE for his election to the prestigious US National Academy of Sciences. Prof. Indranil Manna, Director IIT Kanpur and Vice - President INAE, along with Prof. M Anandakrishnan, Chairman, Board of Governors IIT Kanpur presided over the function. The felicitations ceremony was attended by around 60 people including 10 Fellows of INAE. It was highlighted that Prof. Agrawal is the fourth Fellow of INAE to be elected as a member of US National Academy of Sciences.
- The INAE Kanpur Local Chapter, along with Department of Chemical Engineering, IIT Kanpur, and Indian National Science Academy (INSA) Kanpur Local Chapter, felicitated Prof. Yogesh Joshi, an INAE Young Associate on his being selected for the Shanti Swarup Bhatnagar Prize in



*Felicitations of Prof. Manindra Agrawal (middle). On the right side - Prof. M Anandakrishnan, Chairman BOG, IIT Kanpur while on the left side Prof. I. Manna, Director, IIT Kanpur & Vice President INAE*





Engineering Sciences for the year 2015. Prof. Joshi had received INAE Young Engineer Award in 2008, and is at present Honorary Secretary of the INAE Kanpur Local Chapter. This event was organized in IIT Kanpur and was attended by around 100 people.



*Prof. Yogesh Joshi receiving a plaque during his felicitation ceremony from Prof. I. Manna, Director, IIT Kanpur and Vice President INAE*

## **2. Seminars organized by INAE Kanpur Local Chapter**

The chapter organized following five seminars during the year 2015-16 at IIT Kanpur.

- i. Prof. A. K. Pradhan, FNAE, from Department of Electrical Engineering, IIT Kharagpur, delivered a lecture on 13<sup>th</sup> April 2015 on “*Evolving New Generation of Intelligent Protection*”. The seminar was co-organized with the IEEE U.P. Section IAS/PES joint chapter and was attended by around 50 persons.
- ii. Dr. K.N. Srivastava, from ABB Global research Lab., Sweden, delivered a lecture on 24<sup>th</sup> August 2015 on “*The World in 2030 and the Disruptive Potential of Solar PV and Electric Vehicles*”. The seminar was co-organized with the IEEE U.P. Section IAS/PES joint chapter and was attended by around 45 persons.
- iii. Prof. Avinash Kumar Agarwal, FNAE, from Department of Mechanical Engineering, IIT Kanpur, delivered a lecture on 3<sup>rd</sup> November 2015 on “*Use of Lasers and Optical Diagnostics for Next Generation IC Engine Development: Ushearing New Era in Engine Development*”. The seminar was attended by around 55 persons.
- iv. Prof. S.A. Soman, FNAE, from Department of Electrical Engineering, IIT Bombay, delivered a lecture on 20<sup>th</sup> November 2015 on “*Synchrophasor Analytics for Electrical Transmission Systems to avoid Blackouts*”. The seminar was attended by around 65 persons.
- v. Prof. Sachchida Nand Tripathi, FNAE, from Department of Civil Engineering, IIT Kanpur, delivered a lecture on 20<sup>th</sup> January 2016 on “*Smoke, Dust, and Haze: Implications to Health, Climate, and Economy*”. The seminar was attended by around 40 persons.



*Prof. Avinash Agarwal delivering the INAE lecture at IIT Kanpur*



*Prof. S. C. Srivastava, along with Dr. M. Ramamoorthy and Sh. Mata Prasad presenting a memento to Prof. S.A. Soman for delivering INAE lecture.*



*Prof. S. C. Srivastava presenting a memento to Prof. S. N. Tripathi for delivering INAE lecture*

The abstract of the seminars are as under.

- (i) **Evolving New Generation of Intelligent Protection :** Numerical relays have delivered a wealth of new functions; built-in digital fault recording, sequential event recording, metering, multiple settings groups, easier adaptivity to changing system conditions, fault location, and digital communication, to name only a few. Remarkable cost and space savings accelerated adoption of the new technology. Early implementations were limited by the small amount of information available to the relays and their limited ability to process this information. Designers skilfully worked around the low sampling rates and scarce processing power in order to deliver sophisticated algorithms with many performance improvements over the older generations of relays. Adaptive directional elements, voltage transformer transient detection logic for distance protection, load encroachment and blinders, and adaptive distance elements for ground distance protection are good examples of protection enhancements compared to previous relay technologies. Modern relay implementations have access to more information, higher sampling rates, more direct inputs, and more auxiliary signals delivered via communication from other devices. These relays have more processing power to utilize the available information, yielding better performance and facilitating new functions.
- (ii) **The World in 2030 and the Disruptive Potential of Solar PV and Electric Vehicles:** The world of 2030 will be radically different from the world of today. Some of the major tectonic shifts predicted are growth of middle class globally, shift of economic powers to the east and the south, widespread aging, massive urbanization, food, water and energy pressures. These trends exist even today and are virtually certain to continue during the next 15-20 years with much greater momentum.

Food, water and energy are inseparably connected. Water is an input for producing agricultural goods in the fields and along the entire agro-food supply chain. Energy is required to pump water from groundwater or surface water sources. Energy is also required to distribute water and food, to power tractors and irrigation machinery and to process and transport agricultural goods.

The world of 2030 will be hungrier for energy. Total consumption of coal, oil, and gas has doubled since the early 1970s and electrical generation from all sources has nearly tripled. Despite

this, more than 1.3 billion people still live without electricity and even without providing them access to electricity, the demand for energy is expected to go up by another 50 percent between now and 2030. As fossil fuels are burnt, they produce greenhouse gases like carbon dioxide or pollution, including sulphur dioxide. The reserves of fossil fuels are also limited.

Solar PV is an essential component in the new energy revolution. The technology cost curve suggests that PV will become the world's main source of energy well before 2030. The complementary technologies that will, together with PV, disrupt the whole energy industry are electric vehicles and self-driving cars. Solar PV dematerializes energy. You don't burn anything to charge your computer. The same thing happens if you charge your electric vehicle with solar energy. When you combine these disruptive characteristics of PV with the complementary disruptive characteristics of electric vehicles, it's a one-two punch that conventional energy companies will not be able to survive.

This talk presented a look forward at the future of electricity generation, use of electricity and how the power system would develop to meet the needs of consumers. These technologies are disruptive in nature and expected to shape the future of electric power systems in view of fast declining cost of solar cells, Lithium-ion batteries and sensors.

- (iii) **Use of Lasers and Optical Diagnostics for Next Generation IC Engine Development: Ushering New Era in Engine Development:** Researchers are constantly trying to improve engine efficiencies and control emissions in a very challenging environment. This demands complying with ever-increasing requirement of tightening emission norms in addition to fuel economy globally, which are prime driving forces in automotive industry globally. There are two parts to this INAE talk. The first part deals with laser ignition of combustible charge and the second part deals with application of optical diagnostics such as PIV, PDI and endoscopy to engines. The combustion and emission behaviour of hydrogen-air mixture and methane-air mixture in an engine and control of NO<sub>x</sub> emissions using laser ignition is covered in the first part of this talk. A conventional electrical spark ignition system and a laser ignition system were used for comparative study of performance and emission characteristics of a customized hydrogen fuelled engine prototype developed in ERL.

Laser diagnostics has emerged as a very valuable diagnostic tool in development of engine power-train and emission control technology development in last one decade. Laser based measurements in real time in the engine combustion chamber have ushered a new era of finding answers to some of the intriguing in-cylinder processes, which were only speculated until recently. This strength has enabled engine researchers to sharpen their modelling tools using experimental data from realistic geometry engines firing under varying loads. Airflow structures developed inside the engine combustion chamber significantly influence the air-fuel mixing. In-cylinder air flow characteristics of a motored, four-valve diesel engine were investigated using time-resolved Tomographic Particle Imaging Velocimetry (TR-Tomo-PIV) in ERL. Fuel-air mixing and combustion are mainly affected by in-cylinder air flows and fuel sprays. Fuel spray characteristics were determined using Phase Doppler Interferometry (PDI), which provides information about droplet size distribution and 3D-velocity distributions. To gain visuals of combustion processes in a production engine's combustion chamber at high loads, another optical diagnostic technique "engine endoscopy" was used for spatial combustion visualization, soot distribution and temperature distribution.





- (iv) **Synchrophasor Analytics for Electrical Transmission Systems to avoid Blackouts:** Phasor measurement units (PMU) are used to measure phasors that are consistent across a wide geographical area of a power system. For this purpose, we need a system wide common reference phasor, which is derived from the time synchronisation signal of a GPS. GPS provides an accurate 1 pulse per second signal with an accuracy of 1 microsecond which translates to 0.018 degree angle accuracy for phasor. Such system wide consistent phasors are called synchrophasors. To use them effectively, time stamped synchrophasors are streamed at a high rate e.g., 1 phasor every cycle i.e., every 20 ms to a common location. A phasor data concentrator then time aligns them and streams it to prospective applications. Initially, such systems were conceived for improved system monitoring including oscillation monitoring and better postmortem analysis of grid events. However, with increasing penetration of PMUs in the system, and availability of fibre optic backbone, more exciting applications that span from offline applications like line parameter estimation to real time applications like supervising a distance relay are being planned. In this talk, speaker shared his perception of synchrophasor analytics and how it can lead to development of a self healing network.
- (v) **Smoke, Dust, and Haze: Implications to Health, Climate, and Economy:** Smoke, dust, and haze (atmospheric aerosol), associated with natural and anthropogenic sources, are a vital component of the Earth system. It has multi-dimensional socio-environmental impacts, which include climate modulation, adverse health effects, reduced visibility, and material and ecosystem damage. It affects Earth's climate both directly by scattering and absorption of radiation, and indirectly by serving as cloud condensation nuclei, thereby changing cloud properties. The recent Intergovernmental Panel for Climate Change report [IPCC 2013] emphasized that the present uncertainties of aerosol radiative properties and aerosol-cloud interactions represented in climate models contribute the largest uncertainties in the estimates of future climate. The linkage between aerosol and hydrological cycle, and its effects on water budget make it crucial to the human population that heavily depends on monsoon system. Soiling of heritage buildings and monuments warrants much government attention from an economics point of view. The global importance of aerosol research could be understood from the relatively high frequency (~100 papers/year) of published articles in leading international scientific Journals (Nature, Science and PNAS) in the last one decade. This talk presented the key results on aerosol characteristics in different environmental conditions, and their implications to human health, agriculture, historical monuments, and climate.

### 3. *Celebration of 48th Engineers Day*

The Indian National Academy of Engineering (INAE) Kanpur Local Chapter, along with The Institution of Electronic & Telecommunication Engineers Kanpur Centre and The Institution of Engineers (India) Kanpur Local Centre organized 48th Engineers Day Celebration on the 154<sup>th</sup> Birth Anniversary of Bharat Ratna Sir M. Visvesvaraya. It was attended by over 100 persons including several Fellows of INAE, IE(I) and IETE. Prof. A. K. Chaturvedi, Deputy Director, and Professor, Department of Electrical Engineering, IIT Kanpur, delivered the theme lecture on "Engineering Challenges For Knowledge Era". Er. Anupam Agarwal, General Manager Panki Power House, U.P. Rajya Vidyut Utpadan Nigam Ltd. Kanpur was the Chief Guest, and Prof. Indranil Manna, Director, IIT Kanpur and Vice President, INAE, was the Guest of Honour.



## **INAE Chennai Local Chapter**

INAE Local Chapter at Chennai has been activated under the Chairmanship of Prof Bhaskar Ramamurthi, Director, Indian Institute of Technology Madras. Prof. BS Murty, Head, Department of Metallurgical & Materials Engineering, IIT Madras is the Honorary Secretary of the INAE Chennai Local Chapter. INAE Chennai Local Chapter along with INSA Chennai Chapter and IIT Madras organized a talk on “Linking Agriculture with Nutrition and Health” by Prof MS Swaminathan, Founder Chairman and Chief Mentor, UNESCO Chair in Ecotechnology, MS Swaminathan Research Foundation on Feb 10, 2016 at IIT Madras, Chennai. All INAE Fellows in and around Chennai were invited to attend the talk.

## **INAE Kolkata Local Chapter**

INAE-Kolkata Chapter has celebrated “Engineers’ Day” on 15<sup>th</sup> September 2015. Prof. Bhabatosh Chanda, FNAE presided over the meeting. A seminar lecture by Prof. Pushpak Bhattacharyya, Director, IIT Patna on “Natural Language Processing and Machine Learning: Synergy or Discord” was arranged in collaboration with the Centre for Soft Computing Research, Indian Statistical Institute. A large number of students, researchers and Faculty members of Indian Statistical Institute including the Fellows of INAE attended the meeting.

The abstract of the lecture by Prof. Pushpak Bhattacharyya is as under.

Today’s NLP is highly machine learning oriented. Huge volumes of text in electronic form are available for processing, and it is hoped that the data will reveal the underlying regularities. One typically postulates a distribution, applies maximum likelihood or maximum entropy methods to find parameters, and uses the learnt distribution to predict linguistic phenomena. In this picture of NLP, linguistics seems to have no role. But as is the observation made repeatedly, accuracy values of prediction are reaching saturation. Since learning algorithms need features, insight into language is crucial for better feature engineering. In this talk NLP tasks were looked at, at various levels of processing and it was shown how computation transitions gradually from being highly data driven to knowledge driven. A development, symptomatic of NLP-ML synergy/discord, called Deep Learning provides hope for large scale language processing, but grapples with the fundamental question of what word embeddings are after all. A number of applications were taken to bring out the need for better synergy between ML and linguistics for high performance NLP systems.

## International Affairs

### CAETS 2015 Convocation on 'Pathways to Sustainability: Energy, Mobility and Healthcare Engineering'

The Indian National Academy of Engineering is a Member-Academy of the International Council of Academies of Engineering and Technological Sciences (CAETS) and participates in its programmes/convocations of global concern for benefits. As per the rotation policy, CAETS 2015 Annual Meetings and Convocation were hosted by INAE during Oct 12-16, 2015 at Convention Hall, Hotel Ashok, New Delhi. This was the first time that the CAETS Annual Meetings and Convocation were held in India. INAE chose the theme of the Convocation as "Pathways to Sustainability: Energy, Mobility and Healthcare Engineering".

The event was inaugurated by Dr. Harsh Vardhan, Hon'ble Minister of Science and Technology & Earth Sciences on Oct 13, 2015 at Hotel Ashok, New Delhi. Besides Hon'ble Minister, Dr. Ashutosh Sharma, Secretary, Department of Science and Technology; Dr. Baldev Raj, President, CAETS; Dr. BN Suresh, President, INAE, Dr. R Chidambaram, Principal Scientific Advisor to Govt. of India and Dr. KV Raghavan, Vice-President, INAE were the dignitaries during the Inaugural function. An Electronic Report by CAETS Energy Committee on "*Transitioning to a Lower Carbon Economy: Technological and Engineering Considerations in Building and Transportation Sectors*" was also released by the Chief Guest.



*Dr Harsh Vardhan, Hon'ble Minister for Science and Technology & Earth Sciences delivering Inaugural Address*

In addition to the technical Keynote presentations during the parallel Technical sessions, three plenary lectures were delivered by the luminaries of the engineering community. This session was chaired Dr. R Chidambaram, Principal Scientific Advisor to Govt. of India and Dr. BN Suresh, President, INAE. A Plenary lecture on "*Renaissance and Global Outlook of Electrical Vehicles Development*" was delivered by Prof. CC Chan, Honorary Professor, University of Hong Kong & Founding Director, International Research Centre for Electric Vehicles, Hong Kong; lecture on "*Low Carbon Pathways for India and the World*" was delivered by

Dr. Anil Kakodkar, INAE Satish Dhawan Chair of Engineering Eminence and Formerly Chairman, Atomic Energy Commission and Secretary, Department of Atomic Energy, Govt. of India and a lecture on “*Engineering Medicine for a Global Society*” was delivered by Prof. Roderic Pettigrew, Director, National Institute of Biomedical Imaging and Bio-engineering, NIH, USA.

The presentations on the themes of the Convocation were then held in three parallel tracks on “Energy”, “Mobility” and “Healthcare Engineering”. The technical sessions covered under the theme on “Energy” were ‘*Advances in Energy Resources and Technologies*’, ‘*Energy Options and Scenarios*’, ‘*Advances in Energy Materials and Applications*’ and *Panel Discussion on Transition to Lower Carbon Economy*. Similarly the technical sessions covered under the Theme on “Mobility” were ‘*Advances in Mobility Engineering*’, ‘*Mobility and Transportation Structures*’, ‘*Intelligent Transport Technologies*’ and *Panel Discussion on Dilemmas of Mass Transportation in emerging economies*. The Technical Sessions covered under the Theme on “Healthcare Engineering” were on the ‘*Advances in Healthcare Engineering*’, ‘*Next Generation Devices & Technologies*’, ‘*Informatics & Analytics*’ and ‘*Panel Discussion on Have Engineering and Healthcare really Converged?*’



*Valedictory Session on Oct 14, 2015*

The Valedictory Session was chaired by Dr. K Kasturirangan, INAE Satish Dhawan Chair of Engineering Eminence & Formerly Chairman Space Commission & Secretary, Department of Space, India; Dr. Baldev Raj, President, CAETS & Director, National Institute of Advanced Studies, Bangalore, and Dr. BN Suresh, President, Indian National Academy of Engineering (INAE) & Vikram Sarabhai Distinguished Professor, ISRO Headquarters, Bangalore. The session summed up the proceedings and the recommendations emanating of the technical sessions on the three parallel themes on “Energy”, “Mobility” and “Healthcare Engineering”. Based on the summing up held during the Valedictory Session, the CAETS statement was released and posted on the CAETS website.





*Delegates from CAETS Member Academies during CAETS 2015 Convocation*

The Convocation was attended by more than 250 Indian and 100 foreign participants from 24 countries across the world. INAE had also taken an initiative to enhance the participation of young engineers below 45 years of age. The young engineers were invited for participating in the CAETS 2015 Convocation as 'Poster Presenters'. On receipt of the abstracts for poster presentation; a jury shortlisted a few "Poster Presenters" to deliver invited lectures, during the technical sessions of the Convocation. Around 40 young engineers participated in the event including the Young Engineers from the Member Academies who presented the poster presentation and lectures during the technical sessions. An exhibition was also organized on the sidelines of the convocation to highlight the technological advancements of respective organizations. Tata Consultancy Services, Energy Efficiency Services Limited etc were a few organizations that participated in the exhibition. A number of social events for the participants were organized during the event. One of the highlight of the social events was a Cultural Programme which gave a glimpse of folk dances of India which was appreciated by all.

## The Fellowship

### Newly Elected Fellows

The following were elected as Fellows of the Academy w.e.f. Nov 1, 2015.

#### ***Engineering Section-I***

- 1 Prof. Sachchida Nand Tripathi, Department of Civil Engineering, Indian Institute of Technology Kanpur.
- 2 Mr. VN Heggade, Senior Vice-President, Member Board of Management, Gammon India Ltd., Mumbai.

#### ***Engineering Section-II***

- 1 Dr. L Sunil Chandran, Associate Professor, Department of Computer Science and Automation, Indian Institute of Science, Bangalore.
- 2 Prof. Krishna Moorthy Sivalingam, Professor, Department of Computer Science and Engineering, Indian Institute of Technology Madras, Chennai.
- 3 Prof. Pushpak Bhattacharyya, Director, Indian Institute of Technology Patna.
- 4 Dr. Manish Gupta, Vice-President and Director, Xerox Research Centre India, Bangalore.
- 5 Dr. Shivkumar Kalyanaraman, Programme Director, Special Initiatives, IBM Research-India, Bangalore.

#### ***Engineering Section-III***

- 1 Prof. Amit Agrawal, Professor, Department of Mechanical Engineering, Indian Institute of Technology Bombay, Mumbai.
- 2 Prof. Avinash Kumar Agarwal, Poonam & Prabhu Goyal Endowed Chair Professor, Department of Mechanical Engineering, Indian Institute of Technology Kanpur, Kanpur.
- 3 Prof. Anindya Deb, Professor, Centre for Product Design & Manufacturing, Indian Institute of Science, Bangalore.
- 4 Dr. Dasharath Ram, OS & Sc. 'H', Project Director, Hypersonic Wind Tunnel and Associate Director, Defence Research and Development Laboratory (DRDL), Hyderabad.

#### ***Engineering Section-IV***

- 1 Mr. Rajeev M Pandia, Company Director and Adviser, 701, Benson, Saibaba Road, Santacruz (West), Mumbai.

#### ***Engineering Section-V***

- 1 Prof. SA Soman, Professor, Department of Electrical Engineering, Indian Institute of Technology Bombay, Mumbai.





### ***Engineering Section-VI***

- 1 Dr. Amrutur Bharadwaj, Professor, Electrical Communication Engineering Department, Indian Institute of Science, Bangalore.
- 2 Mr. Narasimhan Venkatesh, Senior Vice President, Advanced Technologies, Redpine Signals, Inc., Hyderabad.

### ***Engineering Section-VII***

- 1 Prof. Hari Bhagwan Hablani, Professor, Department of Mechanical Engineering, Indian Institute of Technology Gandhinagar, Ahmedabad.
- 2 Mr. S Somanath, Director, Liquid Propulsion Systems Centre (LPSC), ISRO, Trivandrum.

### ***Engineering Section-VIII***

- 1 Prof. Bikramjit Basu, Professor, Material Research Centre, Indian Institute of Science, Bangalore.
- 2 Dr. Rajendra Nath Basu, Chief Scientist, Fuel Cell & Battery Division, CSIR-Central Glass & Ceramic Research Institute, Kolkata.
- 3 Mr. Debashish Deb, General Manager (SED), Sukhoi Engine Division, HAL, Dist.-Koraput, Odisha.

### ***Engineering Section-IX***

- 1 Prof. Santanu Bandyopadhyay, Professor, Department of Energy Science and Engineering, Indian Institute of Technology Bombay, Mumbai.
- 2 Mr. Gurvinder Jit Singh Bindra, President – Project Engg. & Mgmt., BGR Energy, Gurgaon.

### ***Engineering Section-X***

- 1 Prof. DD Sarma, Professor, Solid State & Structural Chemistry Unit, Indian Institute of Science, Bengaluru.
- 2 Dr. Rajiv Kumar Tayal, Advisor/Scientist-G, Department of Science and Technology, New Delhi.
- 3 Dr. Kalyanasundaram Subramanian, Chief Scientific Officer, Strand Life Sciences Pvt. Ltd., Bangalore.

### ***Foreign Fellows***

- 1 Prof. Sanjoy K. Mitter, Professor, Electrical Engineering, Massachusetts Institute of Technology, USA.
- 2 Prof. Sir David Neil Payne, Director, Optoelectronics Research Centre, University of Southampton, U.K.
- 3 Prof. John P. Holdren, Professor and Director, Program on Science, Technology and Public Policy, Harvard University, USA.
- 4 Prof. Ashok J. Gadgil, Deputy for Science & Technology, Energy Technologies Area, Lawrence Berkeley National Laboratory, USA and Professor of Civil and Environment Engineering, University of California, USA.
- 5 Prof. JN Reddy, Distinguished Professor and holder of Oscar S Wyatt Endowed Chair, Department of Mechanical Engineering, College Station, USA.

## Honours and Awards

### Republic Day Award

Dr Vasudev Kalkunte Aatre, FNAE, Formerly Scientific Adviser to Raksha Mantri, Ministry of Defence, New Delhi; Formerly Director, NPOL, Cochin and Former CC (R&D), DRDO, New Delhi was conferred with the prestigious award of Padma Vibhushan, by the Hon'ble President of India on Republic Day, January 26, 2016

### Other Awards

The details of other awards received by INAE Fellows during the year are given below.

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | Dr BN Suresh, FNAE, President, INAE and Vikram Sarabhai Distinguished Professor, Indian Space Research Organization was awarded the Karnataka Science and Technology Academy (KSTA), Lifetime Achievement Award 2015 on Nov 5, 2015 at Bangalore.                                                                                                                                                                                                                                                                                                                                                                             |
| 2. | Dr. Baldev Raj, Director, National Institute of Advanced Studies, Bangalore has been conferred with HK Firodia Vijnan Ratna Award instituted by HKF Foundation.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 3. | Dr G. Satheesh Reddy, FNAE, Scientific Advisor to Raksha Mantri, (SA to RM) has been conferred with the prestigious Silver Medal of Royal Aeronautical Society, UK. He has been conferred the Bharat Ratna Sir Mokshagundam Visvesvaraya Award by the Institution of Engineers (India) during 48th Engineers Day Celebrations. Dr. Satheesh Reddy has been conferred with the prestigious National Systems Gold Medal by the Systems Society of India and the first Institution of Engineers (India) IEEI- Institute of Electrical and Electronic Engineers (IEEE –India) Award for Engineering Excellence for the year 2015. |
| 4. | Col SP Wahi, Padma Bhushan Awardee and Chairman, SP Wahi Management and Technology Consultants Pvt. Ltd., Gurgaon and Formerly Chairman, Oil & Natural Gas Commission has been conferred with 2015 Urja Award on 27th March 2015 during Urja Sangam inaugurated by Hon'ble Prime Minister of India, Shri. Narendra Modi at New Delhi.                                                                                                                                                                                                                                                                                         |
| 5. | Prof. HKDH Bhadeshia, Professor of Physical Metallurgy, University of Cambridge and a Foreign Fellow of INAE, has been knighted by Her Majesty, Queen of England for his work on metals. He is responsible for the discovery of a special kind of steel -'super bainite' which is used for railway tracks, as well as the world's strongest armour.                                                                                                                                                                                                                                                                           |
| 6. | Prof. JC Misra, Adjunct Professor, Indian Institute of Engineering Science and Technology, Shibpur, Howrah was awarded the "Life Time Achievement Award" by the VENUS International Foundation during the award ceremony held in Chennai on 5th July 2015.                                                                                                                                                                                                                                                                                                                                                                    |
| 7. | Prof. Chandra Shakher, Instrument Design Development Centre, Indian Institute of Technology Delhi has been conferred with the 2014 ICO Galileo Galilei Award for outstanding contributions to the field of holographic and speckle metrology.                                                                                                                                                                                                                                                                                                                                                                                 |
| 8. | Prof Dr B M Reddy, Chief Scientist & Head, Inorganic & Physical Chemistry Division, CSIR - Indian Institute of Chemical Technology (IICT) Hyderabad; Professor, Academy of Scientific & Innovative Research (AcSIR) has received the Bronze Medal from Chemical Research Society of India.                                                                                                                                                                                                                                                                                                                                    |



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|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9.  | Prof M. S. Ananth, formerly, Director, Indian Institute of Technology Madras has been conferred with the I.C.C. D. M. Trivedi Lifetime Achievement Award for Contribution to Indian Chemical Industry for Education & Research by Indian Chemical Council during a special function organized on Sep 30, 2015 at Mumbai.                                                                                                                  |
| 10. | Prof Suresh Bhargava, FNAE Deputy Pro Vice-Chancellor International, College of Science, Engineering & Health and Director of the Centre for Advanced Materials and Industrial Chemistry (CAMIC), School of Applied Sciences, RMIT University, Melbourne, Australia was awarded the 2015 CHEMECA Medal at the CHEMECA conference on Sep 30, 2015 for his outstanding contribution to the profession and practice of chemical engineering. |
| 11. | Prof. J Nanda, FNAE, INSA Honorary Scientist and formerly Professor and Head, Department of Electrical Engineering, NTPC Chair and Dean, Indian Institute of Technology Delhi received the Khosla National Award 2015 for Life Time Achievements in Science and Technology at the Convocation of IIT Roorkee held on 3rd October 2015.                                                                                                    |
| 12. | Prof Mahesh Tandon, FNAE, Managing Director of Tandon Consultants Pvt Ltd (TCPL), New Delhi received the “Indian Building Congress Infrastructure Award” on September 1, 2015 at New Delhi for his organization TCPL. TCPL was also conferred the “Industry Excellence Award” by the Institution of Engineers (India) at the Indian Engineering Congress held on December 17, 2015 at Guwahati.                                           |

## News of Fellows

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | Dr BN Suresh, FNAE, President, INAE & Vikram Sarabhai Distinguished Professor, ISRO Headquarters, Bangalore and Dr K Sivan, FNAE, Director, Vikram Sarabhai Space Centre, Thiruvananthapuram have co-authored a book on "Integrated Design for Space Transportation System" published by M/s Springer . The book was printed in Netherlands and both electronic and print versions are available in the prominent book websites all over the globe. The link giving details of the book is also available in all prominent publishers' websites. Further details can be viewed in a link of Amazon <a href="http://www.springer.com/in/book/9788132225317">http://www.springer.com/in/book/9788132225317</a>                                                                      |
| 2. | Dr Baldev Raj, FNAE, Director, National Institute of Advanced Studies, Bangalore and Immediate Past- President, INAE has been appointed as Chairman, Board of Governors, National Design and Research Forum, The Institution of Engineers (India) for the year 2015-2016. He has also become Member, Karnataka State Council for Science and Technology; Member, Apex Council of Prime Minister's Fellowship Scheme for Doctoral Research and Industry Collaboration; Chairman, Task Force of CII for bridging Academia and Research, Industry collaboration in Higher Education and Co-Chairman, Science Policy Committee of DST. Dr Baldev Raj was the President of the International Council of Academies of Engineering and Technological Sciences (CAETS) for the year 2015. |
| 3. | Prof Indranil Manna, FNAE, Vice-President, INAE and Director, Indian Institute of Technology, Kanpur was elected as Fellow, The World Academy of Sciences on Nov 19, 2015.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 4. | A new book titled "Blueprint of a Good Life" authored by Dr Purnendu Ghosh, Executive Director, Birla Institute of Scientific Research, Jaipur has been brought out. Further details can be viewed at the Youtube Link <a href="https://www.youtube.com/watch?v=XCXHLRqflUo&amp;feature=youtu.be">https://www.youtube.com/watch?v=XCXHLRqflUo&amp;feature=youtu.be</a>                                                                                                                                                                                                                                                                                                                                                                                                            |
|    | Dr. Purnendu Ghosh has also has brought out a new book "Parichit se Parichay". The book, published by Bodhi Prakashan, is a collection of poetry in Hindi. He also published a book on "Ethics Of The Chair". The book is a reflection of the author's working at various institutions in the past four decades. Some of the truths that have guided him to maintain the ethics of his chair are: intentions and outcomes are not always the same though one wishes them to be so, life doesn't merely follow the rigid rules, half-truths are more dangerous than complete falsehoods, to become world class one must have the desire to become world class, intellect is essential part of any make-up, and respect the chair you occupy.                                       |
| 5. | Dr. G Satheesh Reddy, Distinguished Scientist, RCI, DRDO, Hyderabad has taken over as Scientific Adviser to Raksha Mantri, Ministry of Defence, New Delhi. Dr. G Satheesh Reddy was also conferred with the Honorary Degree of Doctor of Science (D.Sc. h.c.) by Amity University, Noida and Jawaharlal Nehru Technological University Kakinada (JNTUK) in recognition of his significant national contributions to Defence Science and Technology.                                                                                                                                                                                                                                                                                                                               |
| 6. | A recent article in the Telegraph claims that a paper by Prof Kalyanmoy Deb, Department of Mechanical Engineering, Indian Institute of Technology, Kanpur on Nondominated Sorting Genetic Algorithm II (NSGA-II) (published in 2002 in IEEE Trans. on Evolutionary Compu-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |



|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | tation) has emerged as the first-ever paper from India to exceed 5,000+ Web of Science citations. The NSGA-II paper now has 6,035 Web of Science citations and 14,000+ Google Scholar citations. This is exceptional news for engineering and computing field, as no other single paper from any other discipline and researched in India was able to reach this landmark number before.                                                                                                                                                                                                                                                                                                                                                      |
| 7.  | Prof Dr B M Reddy, Chief Scientist & Head, Inorganic & Physical Chemistry Division, CSIR - Indian Institute of Chemical Technology (IICT) Hyderabad; Professor, Academy of Scientific & Innovative Research (AcSIR) has become Honorary Treasurer (2015-17) and Founder Fellow, Telangana State Academy of Sciences                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 8.  | The chapter downloads for the Book published by Springer Publishers on “Modelling Diesel Combustion” authored by Dr PA Lakshminarayanan, FNAE, Chief Technical Officer, Simpson and Co. Ltd., Chennai and Dr Yoghesh V. Aghav have increased by 100% each year, for the last three years.                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 9.  | Prof. Manindra Agrawal, Department of Computer Science & Engineering, Indian Institute of Technology, Kanpur has been elected as a Member of US National Academy of Sciences.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 10. | Prof Santosh Kapuria, R. Gupta Chair Professor, Department of Applied Mechanics Indian Institute of Technology Delhi has been elected as Fellow of the National Academy of Sciences, India (NASI) in the year 2015.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 11. | Prof Mahesh Tandon, FNAE, Managing Director, Tandon Consultants Pvt Ltd, New Delhi was conferred the “Honorary Fellowship” of The Indian Concrete Institute on October 10, 2015 at Kolkata.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 12. | Prof. Amlan J. Pal, FNAE, Senior Professor, Indian Association for the Cultivation of Science, Kolkata, has been elected as Fellow of Indian National Science Academy (INSA).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 13. | Prof Arvind Kudchadker, FNAE, Emeritus Professor, IIT Bombay has published a book as e-book on 'Creating a New Technological Institute'. Further details may be viewed in the link <a href="https://arvind1934.wordpress.com/">https://arvind1934.wordpress.com/</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 14. | Prof Debabrata Das, Department of Biotechnology and Professor-in-Charge, PK Sinha Centre for Bioenergy, Indian Institute of Technology Kharagpur has been selected for the for the International Association for Hydrogen Energy (IAHE) Fellowship for the year 2016; for his contributions to research and development in hydrogen energy, including biological hydrogen production. The Fellowship Certificate will be presented at the World Hydrogen Energy Conference (WHEC) 2016 to be held on June 13, 2016 at Zaragoza, Spain. Prof Das has also authored two books viz. “Biohydrogen Production: Fundamentals and Technology Advances” published by CRC Press and “Algal Biorefinery: An Integrated Approach” published by Springer. |



## Fellows Deceased in Last one Year

The Council learned with deep regret regarding the demise of the following Fellows during the period April 1, 2015 to March 31, 2016.

1. Mr. CR Alimchandani, Chairman & Managing Director, STUP Consultants Ltd., Mumbai.
2. Prof. Ajit K Chattopadhyay, Honorary Emeritus Professor, Department of Electrical Engineering, Bengal Engineering & Science University, Howrah.
3. Dr. APJ Abdul, Former President of India and former Scientific Advisor to Raksha Mantri and Principal Advisor to the Govt. of India.
4. Dr. John J Vithayathil, 6685, West Burnside Road, Unit 355, Portland, USA
5. Mr. AC Wadhawan, Chairman, Transweigh (India) Ltd., New Delhi.
6. Prof. NGR Iyengar, Director, International Institute for Aerospace Engineering and Pro Vice-Chancellor, Jain University, Bangalore.
7. Dr. Rakesh Mohan Jha, Scientist G & Group Head, Electromagnetics, Computational Electromagnetics Lab (CEM Lab), Aerospace Electronics and Systems Division (ALD), National Aerospace Laboratories (CSIR-NAL), Bangalore.
8. Dr. Subrata Ganguly, Chairman, West Bengal Electronics Industry Development Corporation Ltd., Kolkata.

Other Fellows deceased earlier and information received during the year are as under.

1. Prof. N Seshagiri, Formerly Special Secretary to the Govt. of India, Planning Commission and Director-General, National Informatics Centre, New Delhi.
2. Dr. BB Sundaresan, Formerly Vice-Chancellor, University of Madras, Chennai.
3. Mr. Pritam Singh, Formerly Chairman, Central Water Commission, New Delhi.
4. Prof. PK Nag, Formerly Professor of Mechanical Engineering, IIT Kharagpur, Emeritus Fellow (AICTE), Jadavpur University, Kolkata.
5. Dr. RN Mukherjea, Honorary Director, Process Engineering Design & Development Institute, Kolkata.
6. Prof. R Pitchai, Formerly Professor of Civil Engineering, IIT Madras, Chennai
7. Prof. Donald Oscar Thompson, Distinguished Professor Emeritus of Aerospace Engineering, enter for NDE, Iowa State University, USA
8. Prof. AE Fiechter, Founder and formerly Chairman of the Institute of Biotechnology ETH Zurich, Switzerland

## INAE Annual Convention

The Annual Convention of the Indian National Academy of Engineering was held on Dec 10-11, 2015, at Defence Institute of Advanced Technology (DIAT), Pune. The Inaugural Address was delivered by the Chief Guest Mr. Sajjan Jindal, Chairman, JSW Steel. Dr Surendra Pal, Vice- Chancellor, DIAT, Pune delivered the Welcome Remarks. Dr BN Suresh, President, INAE also delivered his Address during the Inaugural Session. The e-version of book titled “**Mind of an Engineer**” being published by M/s Springer which contains articles written by INAE Fellows on their personal experiences and career paths leading to their success as eminent engineers of the country; was released by the Chief Guest, Mr Sajjan Jindal. The website of the INAE Research Journal being brought out shortly titled “INAE Letters” developed by M/s Springer was also launched during the Inaugural Session of the Annual Convention. The Inaugural session also featured Award Lectures by Dr LK Singhal and Prof Sankar K Pal, Professor Jai Krishna Memorial and Professor SN Mitra Memorial Awardees 2015 respectively. Brig Rajan Minocha, Executive Director, INAE proposed the Vote of Thanks.



*Mr. Sajjan Jindal, Chairman, JSW Steel along with Dr. BN Suresh, President, INAE and Dr Surendra Pal, Vice- Chancellor, DIAT, Pune lighting the lamp for inaugurating INAE Annual Convention at Pune*

The major scientific and engineering highlights of the Convention were the presentations by newly elected Fellows and Young Engineer Awardees. The presentations were held in two Parallel Sessions on Dec 10-11, 2015. The list of the technical presentations by Fellows and Young Engineers are given below.

### ***Presentations by Newly Elected Fellows on Dec 10-11, 2015***

- ❖ Prof. Avinash K Agarwal - Use of Lasers and Optical Diagnostics for Next Generation IC Engine Development
- ❖ Mr. Rajeev M Pandia - Engineering and Economics : Creation of Synergy
- ❖ Dr. SK Biswal - Technological Challenges on Low Grade Iron Ore Beneficiation

- ❖ Dr BK Panigrahi - Advanced Signal Processing and AI techniques for Power Quality Assessment
- ❖ Dr. Kalyanasundaram Subramanian - A Virtual Liver to Predict Liver Toxicity
- ❖ Dr. DR Prasada Raju - Technological Solutions for Addressing Water Challenges in Rural Areas
- ❖ Dr. Lalit Kumar - Modern Microwave Tubes & Power Modules-Indigenous Technology Development
- ❖ Prof. Krishna Moorthy Sivalingam - Hybrid Optical-Packet Switching Architectures for Data Center Networks
- ❖ Dr. Manish Gupta - My Journey in High Performance Computing
- ❖ Prof. Santanu Bandyopadhyay - Evolution of Pinch Analysis
- ❖ Mr. VN Heggade - Sustainability Options for Design & Construction Practices in India
- ❖ Dr. P Sivakumar - Development of Main Battle Tank Arjun and its Technologies
- ❖ Dr. Rajendra N. Basu - Key materials issues to develop planar solid oxide fuel cell technology
- ❖ Prof. HB Hablani - Applied Research and Teaching Contributions in Space Flight Vehicles Guidance, Navigation and Control at IITs
- ❖ Mr. Arun Ramchandani - New Product Development for Indian Defence
- ❖ Dr. Shivkumar Kalyanaraman - The Energy-Transportation Nexus
- ❖ Dr. Pushpak Bhattacharyya - The Importance of Language Technology in our Life
- ❖ Mr. Narasimhan Venkatesh - Multiprotocol Wireless in the Internet of Things
- ❖ Prof. Amrutur Bharadwaj - On-chip Clock Delay Measurement and Applications
- ❖ Mr. SK Chande - Generic Lessons from the Accident at Fukushima Nuclear Power Plant
- ❖ Dr. Amit Konar - Brain-Computer Interfacing For Perceptual And Rehabilitative Applications
- ❖ Prof SN Singh - Adaptive Wavelet Neural Network Based Long-term Wind Power Forecasting
- ❖ Prof. Bikramjit Basu - Additive Manufacturing of three Dimensional Porous Scaffolds for Biomedical Applications
- ❖ Prof. Indradev Samajdar - Excitements in Microstructural Engineering
- ❖ Dr. V Narayanan - Cryogenic Propulsion Systems Development in ISRO
- ❖ Prof. Amit Agrawal - Blood plasma separation in a Microdevice
- ❖ Prof. Naresh Tandon - Vibration and Acoustic Emission Monitoring of Ball Bearings
- ❖ Prof. Anindya Deb - CAE-Driven Vehicle Crashworthiness and Occupant Safety Design
- ❖ Dr. Rajiv Tayal - Journey of a Different Kind
- ❖ Dr. R Kothari - Dimensionality Reduction

- ❖ Prof. Debabrata Das - Biohythane process for the maximization of the gaseous energy recovery
- ❖ Prof. SA Soman - Synchrophasor Analytics for Smart Electrical Transmission Systems
- ❖ Prof. Mukesh Sharma - Developing National Air Quality Index

***Presentations by INAE Young Engineer Awardees on Dec 10-11, 2015***

- ❖ Dr. K V Mani Krishna - Phase Transformation and Deformation Studies in Zr Based Alloys : Basic knowledge to Product development
- ❖ Dr. Gurunath Gurralla - Overview of Research Contributions in Power System Stability and Control
- ❖ Dr. Deepak Padmanabhan - Fast, Accurate and Flexible Similarity Search
- ❖ Dr. Arindrajit Chowdhury - Combustion characterization of propellants
- ❖ Dr. Arvind Pattamatta - Energy Transport in micro and nano scales for microelectronic cooling application
- ❖ Dr. V. V. Raghavendra Sai - Optical Chemical and Biosensors for Clinical Diagnosis and Environmental Monitoring
- ❖ Mr. Jasbir Singh - Low Cost High Performance GNSS receiver
- ❖ Dr. Abhishek Kumar - Understanding the Role of Earthquake Source, Propagation Path and Local Site Effect in Controlling the Induced Effects of Earthquakes

***Award Function on Dec 10, 2015***

The Grand Award Ceremony was held on the evening of December 10, 2015. Five theses at Doctoral level, Five Theses at Master's Level and 8 Projects at Bachelor's Level were conferred the Innovative Student Projects Award. Ten candidates were conferred the INAE Young Engineer Award 2015.



*Dr Jagadish Vengala being conferred the Innovative Student Projects Award 2015 at Doctoral level by Dr BN Suresh, President, INAE*



*Dr VV Raghavendra Sai being conferred the INAE Young Engineer Award 2015  
by Dr BN Suresh President, INAE*

Prof Kripa Shanker, Emeritus Fellow, Indian Institute of Technology Kanpur and Prof Dipak Mazumdar, Ministry of Steel Chair Professor, Indian Institute of Technology Kanpur were conferred the INAE Outstanding Teachers Award.



*Prof Kripa Shanker receiving the Outstanding Teachers Award 2015 from Dr BN Suresh, President, INAE*





*Prof Dipak Mazumdar receiving the Outstanding Teachers Award 2015 from Dr BN Suresh, President, INAE*

Dr LK Singhal, Director, JSL Ltd, Hisar and Prof Sankar K Pal, DAE Raja Ramanna Fellow, Distinguished Scientist and Former Director, Indian Statistical Institute, Kolkata were conferred the Prof Jai Krishna Memorial Award and Prof SN Mitra Memorial Award 2015 respectively.



*Dr LK Singhal receiving the Prof Jai Krishna Memorial Award 2015 from Dr BN Suresh, President, INAE*



*Prof Sankar K Pal receiving the Prof SN Mitra Memorial Award 2015 from Dr BN Suresh, President, INAE*

Prof BL Deekshatulu, Formerly Director, National Remote Sensing Agency, Hyderabad and Prof DV Singh, Former Director, IIT Roorkee and Former Vice-Chancellor, University of Roorkee were conferred the Life Time Contribution Award in Engineering 2015.



*Prof BL Deekshatulu receiving the Life Time Contribution Award in Engineering 2015 from Dr BN Suresh, President, INAE*



*Prof DV Singh receiving the Life Time Contribution Award in Engineering 2015 from Dr BN Suresh, President, INAE*

### ***Annual General Meeting of Fellows on Dec 11, 2015***

The 27<sup>th</sup> Annual General Meeting of Fellows was held on Dec 11, 2015. During the Induction Ceremony, the following were formally admitted into the Academy by the President, INAE and signed the Admission Register.

Mr. VN Heggade, Prof. Mukesh Sharma, Prof. Krishna Moorthy Sivalingam, Dr. Manish Gupta, Dr. Shivkumar Kalyanaraman, Prof. Pushpak Bhattacharyya, Dr. Amit Konar, Dr. Ravi Kothari, Prof. Avinash K Agarwal, Dr. P Sivakumar, Mr. Arun Ramchandani, Prof. Amit Agrawal, Prof. Anindya Deb, Prof. Naresh Tandon, Prof. VK Jain, Mr. Rajeev M Pandia, Dr. CV Rode, Prof. SN Singh, Prof. SA Soman, Dr. BK Panigrahi, Dr. Lalit Kumar, Mr. Narasimhan Venkatesh, Prof. Amrutur Bharadwaj, Prof. HB Hablani, Dr. V Narayanan, Dr. SK Biswal, Dr. Rajendra N. Basu, Prof. Bikramjit Basu, Prof. Indradev Samajdar, Prof. Santanu Bandyopadhyay, Mr. SK Chande, Prof. Debabrata Das, Dr. Kalyanasundaram Subramanian, Dr. DR Prasada Raju, Dr. Rajiv Tayal and Dr. S. Venkata Mohan.

During the Brainstorming session, Dr BN Suresh, President, INAE requested the Fellows to give their suggestions. A number of valuable suggestions were received on ways to enhance the visibility of the Academy in the industry and policy domains.

### ***Sidelines Meeting held on Dec 10, 2015***

A meeting of selected INAE Fellows chaired by Dr Anil Kakodkar, was held on Dec 10, 2015 on sidelines of the INAE Annual Convention to discuss and suggest recommendations on the ways to enhance the Academy and Industry Interactions and also to increase the outreach of INAE with policy makers and stakeholders. During the deliberations, a number of valuable suggestions have been received which are being progressed actively.

### ***Plenary Session on Dec 11, 2015***

A Plenary Session was held on Dec 11, 2015 during which the Plenary Lecture on “India’s Nuclear Strategy: Meeting Challenges from the Neighbourhood” was delivered by Dr Manpreet Sethi, Senior Fellow, Centre for Air Power Studies, New Delhi. The Award lectures by Prof Dipak Mazumdar and Prof Kripa Shanker, the Outstanding Teacher Awardees 2015 were also held during the Plenary Session.

### ***The Mind of an Engineer***

The book – The Mind of an Engineer – is an initiative of the INAE. It is a reflection of the experiences of some of the Fellows of the INAE in the field of science, technology and engineering. The book is about the reminiscences, eureka moments, inspirations, challenges and opportunities in the journey the professionals took toward self-realization and the goals they achieved. The book contains 58 articles on diverse topics that truly reflect the way the meaningful mind of an engineer works. The book is published by Springer. The e-version of the book was launched at The Annual Convention of Academy at Pune on 10<sup>th</sup> December 2015.



## Digital Knowledge Resource Centre

The emerging technologies have dynamically changed the way information is gathered, organized, accessed, stored and consumed. E-resources are the need of the hour for research and academic activities and help in faster access and retrieval of information in various disciplines. In order to meet the need for use of e-resources for the purpose of research work, the Governing Council during its meeting held on December 12, 2013, decided to set up a Digital Knowledge Resource Centre (DKRC) at 6th floor, Vishwakarma Bhawan, Shaheed Jeet Singh Marg, New Delhi.

A committee chaired by Dr. Sanak Mishra with Prof. SK Koul, Centre for Applied Research in Electronics, IIT Delhi; Dr. Sukumar Mishra, Department of Electrical Engineering, IIT Delhi; Dr. Rajeev Shorey, Project Director, Media Lab Asia, Department of Information Technology, Govt. of India, New Delhi; Brig SC Marwaha, Advisor (Academic & Research) and Mrs. Debjani Bhattacharya, Research Officer, INAE as Members, was constituted to identify facilities/infrastructure to meet specific needs of INAE at DKRC.

The first meeting of this committee was held on Feb 7, 2014, during which it was decided that the following facilities should be created at DKRC:

- a) A repository of digital copies of Indian/ foreign publications pertaining to the issues of national importance viz. Energy, Water and Environment Management, Healthcare Technologies, Mobility & Transportation, Manufacturing and Information Technology.
- b) Database for important engineering information. A repository of engineering books, monographs and on-line access to e-journals of high cost and academic value.
- c) Provider of documentation services to INAE Fellows.
- d) Harness information technology applications in information management.
- e) Provide formal linkages of communication among the engineering community in the form of Research Journals, in different areas of engineering and technology.

The committee decided that the implementation of facilities to be created at DKRC will be done in the following phases:

| Phase            | Brief Details                                                                                                                                                                                      |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Phase I</b>   | Obtain access to e-journals from foreign publishers (IEEE, Royal Society of Chemistry, Taylor & Francis, Springer, Wiley Blackwell, Web of Science etc.), through DST-NISCAIR e-consortium (NKRC). |
| <b>Phase II</b>  | Provide online access to above e-journals to Fellows of INAE in their locations.                                                                                                                   |
| <b>Phase III</b> | Obtaining details of research work /activities / publications etc. from INAE Fellows and building a DATA BANK.                                                                                     |
| <b>Phase IV</b>  | Sharing of above details (mentioned in Phase III) through repository at DKRC, amongst INAE Fellowship.                                                                                             |
| <b>Phase V</b>   | Obtain access to report/material of Indian and foreign publications( e.g. CAETS Academies) pertaining to issues of national importance viz. Energy, Water and                                      |



Environment Management, Healthcare Technologies, Mobility & Transportation, Manufacturing and Information Technology and provide this access to INAE fellowship through repository at DKRC.

**Phase VI** Additional facilities to be created.

Discussion was held with Dr. G. Mahesh, Principal Scientist, and Head, E-Resources & Informetrics, in his office at NISCAIR-NKRC on Feb 12, 2014. E-resources available with NISCAIR and the process for enabling INAE to access online resources of DST-NISCAIR e-consortium were discussed. As advised by him suitable instructions were got issued by DST to NISCAIR- NKRC for making the e-access to e-journals from various foreign publishers available to INAE.

A Dell PowerEdge T-620 Tower Server has been installed at INAE Office. In order to login to this INAE-DKRC server and get e-access to available resources, a web portal solution with built in squid proxy server has been installed with a user friendly web interface powered by KNimbus. For the purpose of remote access, a unique userid and password to each INAE Fellow has been assigned and intimated.

***DKRC Online Repository***

During the next phase we have initiated the task of creating a repository of Research work / Engineering contributions and bibliographic details including abstracts of publications of individual INAE Fellows so that the same can be made available to other Fellows of INAE. This internal Repository would be used only for sharing of content within INAE Fellows.

As a first step, it was decided that we at DKRC should prepare as much details of the research work as possible in respect of INAE Fellows of academia category as the research work pertaining to various Faculty members of IITs/ NITs/ Other Universities can be extracted from respective institutional websites and are in public domain. Besides this, some additional details of their research work are also available in the open domain through internet and Google search. This involves extensive effort at DKRC.

During the last 6 months, we have prepared these details in respect of 290 Fellows which have been sent individually to the concerned Fellows so that they may add/subtract/modify the text as deemed fit and send back to us.

Further processing of the material received from Fellows will involve the following steps:

- (a) The input information to be converted to the format compatible with the repository.
- (b) Metadata of the respective files to be created so that it is amenable for searching the desired information.
- (c) The above material to be uploaded to Knimbus platform.
- (d) Indexing of the above material in a systematic form to facilitate data access.
- (e) Desired links to be created to fetch the required files for a particular search.

The following features will be incorporated in the repository:

- a) **Search based on Author's name:** Any INAE Fellow should be able to search the research publications of another INAE Fellow by using author's name.
- b) **Search based on Engineering Discipline:** Any Fellow would also be able to search for research publication based on engineering discipline (e.g. electrical engineering, chemical engineering etc.).



- c) **Single Window Search:** Single window facility for searching based on topic, keyword, title of paper, subject or author name so that any INAE Fellow can get the desired research publication by using any of the criteria mentioned above.
- d) In the repository section, two separate blocks will be provided to access the research work – one block pertaining to research publications of INAE Fellows and the other block pertaining to CAETS Academies.

## *Publications of the Academy*

### **Research Journal -INAE Letters**

The Agreement for publishing the Research Journal “INAE Letters” has been concluded with M/s Springer as approved by the Governing Council. The website for the Research Journal “INAE Letters” to include facility for submission of papers online has been launched. The first issue of the Research Journal “INAE Letters” will be released shortly.

### **Book titled “Mind of an Engineer”**

The book – The Mind of an Engineer – is an initiative of the INAE. It is a reflection of the experiences of some of the Fellows of the INAE in the field of science, technology and engineering. The book is about the reminiscences, eureka moments, inspirations, challenges and opportunities in the journey the professionals took toward self-realization and the goals they achieved. The book contains 58 articles on diverse topics that truly reflect the way the meaningful mind of an engineer works. The e-version of book titled “Mind of an Engineer” published by M/s Springer which contains articles written by INAE Fellows on their personal experiences and career paths leading to their success as eminent engineers of the country; was released by the Chief Guest, Mr Sajjan Jindal during the Annual Convention of Academy at Pune on 10th December 2015. A complimentary copy of this book has been sent to all the Fellows of INAE.

### **INAE e-Newsletter**

With effect from September 2009, INAE monthly electronic newsletter has been started replacing the erstwhile printed copies of quarterly newsletter. This monthly electronic newsletter contains engineering and technology updates and aspects of frontiers of engineering as well as the news regarding INAE activities. Inputs regarding technology updates are being taken from various sources such as journals/newsletters from DRDO, DAE, DOS, CSIR, S&T Report, Embassy of India in Japan and also from websites pertaining to technology review/updates. This also includes important innovative ideas, which can be absorbed for development of innovative engineering products. A new feature of the e-newsletter is the articles submitted by INAE Fellows, pertaining to the highlights of their childhood, education, mentorship, challenges and innovations, which shall inspire the citizens of India to take and deliver challenges in engineering and technology. The monthly INAE e-Newsletter is being sent to the fellowship through email and is also uploaded on the INAE website [www.inae.in](http://www.inae.in).

### **Annals of INAE**

The Annals of the INAE containing the text of the lectures delivered by Life

Time Contribution Awardees; Professor Jai Krishna and Prof. SN Mitra Memorial Awardees, newly elected Fellows of the Academy and INAE Young Engineer Awardees during the year has been printed and distributed to the Fellowship of the Academy.



## Summary of New Initiatives during the Year

INAE has undertaken a number of new initiatives in terms of commencing new programmes and conduct of unique events during this year, which have enhanced the outreach and visibility of the Academy both in India and abroad. A brief summary of these novel initiatives is highlighted below

### Reaching out to Policy Makers

The necessity of reaching-out to policy makers to improve the visibility of the Academy was emphasised during the General Body meeting of Fellows at Jaipur. Based on the deliberations, a decision was taken to reach out to the policy makers so as to align the activities of the Academy with the thrust areas of the Government of India and the Policy Makers. As a first step in this direction, the meetings with Prof. Ashutosh Sharma, Secretary, DST and Dr. Harsh Vardhan, the Honb'le Minister of Science and Technology, Govt. of India were recently held.

The National Policy issues highlighting the engineering challenges in the country were discussion during the meeting with Prof. Ashutosh Sharma, Secretary, Department of Science and Technology The Secretary, DST during the meeting welcomed the initiatives of INAE to align the activities with the present thrust areas of the Govt of India and assured the necessary assistance in achieving the same. In view of this, INAE-DST Consultative Committee has since been constituted with the aim to meet quarterly to discuss and align the activities undertaken by INAE with the thrust areas of the Govt. of India. The first meeting of INAE-DST Consultative Committee was held on Dec 21, 2015 wherein potential areas were identified to take forward.

Subsequently, Dr Harsh Vardhan, Hon'ble Minister for Science and Technology was briefed on the activities of INAE and requested to consider involvement of INAE on issues of national importance. The response from the Minister was quite positive. The Minister welcomed the suggestion of INAE taking up the detailed studies in certain areas of engineering which are of national importance and to provide the engineering solutions to assist the Govt and the policy makers.

In pursuance of above, a delegation of INAE led by Dr. BN Suresh, President, INAE with Dr. Sanak Mishra, Vice-President, INAE, Prof. Indranil Manna, Vice-President, INAE and Brig Rajan Minocha, Executive Director, INAE met Dr. VK Saraswat, Member, Niti Aayog on June 10, 2015 in his office.

Dr. Saraswat welcomed the suggestions from INAE and reiterated that Niti Aayog would like to work with INAE in the fields identified at national level. Some of the immediate areas of concern discussed are Solar Energy; Manufacturing in Electronics Sector; Machine Tool Manufacturing and Manufacturing of Magnets. A meeting with Dr VK Saraswat and selected domain experts from INAE was held on March 4, 2016 to take this forward.

### INAE Activities with the Govt. of India

INAE is an active partner of the National Initiative of Impacting Research Innovation & Technology (IMPRINT) which has been set up to find engineering solutions to the challenges of national importance. In this regard, it has been decided that INAE Fellowship would be involved in all projects undertaken under IMPRINT India.

## Creation of Corpus Fund

During the recent DST Autonomous Bodies Conclave held at Hyderabad, it was emphasised that as laid down in the General Finance Rules 2005 of the Ministry of Finance, Govt. of India, all Autonomous Institutions are required to maximise generation of internal resources and eventually attain self-sufficiency. The Governing Council of INAE discussed and recommended the requirement for creation of INAE Corpus Fund to be utilized for expenditure related to the establishment and salaries of INAE Secretariat in a first phase. The subject issue was further deliberated in the AGM of Fellows at Pune and it was suggested to initiate actions regarding constitution of a special committee for managing the INAE Corpus Fund to include the planning of investment etc. The special committee has since been constituted and formulated the suitable guidelines for managing the INAE Corpus Fund.

## Creation of data for INAE Expert Pool

A data bank of the expertise of the INAE Fellows and INAE Young Associates has been created to facilitate the selection of experts in various projects/programmes which are undertaken from time to time. The aim of this expert pool is to provide an easy to access and retrieve search engine, to connect the experts to the individuals or agencies looking for their services. It is a single authenticated web portal of national experts in all branches of Engineering and Technology. The easy search engine offers a provision for direct access to the concerned expert for availing expert service.

The benefits of creating the database include Consultancy services to the industry and agencies, Expert services for drawing specifications and selecting vendors/machines, Selection of professionals for specific jobs, Peer reviewing of publications, Examination of technical reports and project proposals, Evaluation or assessment of thesis and research documents and Constitution of expert committees for framing policy. INAE Expert Pool provides an excellent platform to connect the industry with the experts from academia and R&D and promote industry-academia interaction. All INAE Fellows have been requested to submit their profile details online at the link: <http://inae.in/expert-search/index.php/inae-members-form>. The link of this Expert Pool Data has been hosted on INAE website.

The creation of this pool was discussed in the recent meetings with DST and Technology Information, Forecasting and Assessment Council (TIFAC). During the meetings, it has been decided that the domain experts from the Expert pool would be identified and selected for initial peer review by a group of experts for screening and assessment of the project proposals received by DST and TIFAC, from time to time. In addition, the Fellows would also be identified from the Expert Pool to form part of the Project Monitoring Committees (PMC), for projects sanctioned under the aegis of DST and TIFAC. Similar efforts are ongoing for further utilization of the INAE Fellows as domain experts in ongoing programmes of national importance.





# Statement of Accounts

## 2015-16



Indian National Academy of Engineering



**MEHRA MALHOTRA & CO**  
**CHARTERED ACCOUNTANTS**

**Phone : 25733778**  
**16A/7 W.E.A.**  
**KAROL BAGH**  
**NEW DELHI – 110 005**

THE MEMBERS  
INDIAN NATIONAL ACADEMY OF ENGINEERING  
NEW DELHI – 110 016

## **AUDITORS REPORT**

We report that we have audited the Balance Sheet of **INDIAN NATIONAL ACADEMY OF ENGINEERING** as at March 31, 2016 and also the Income and Expenditure Account for the year ended on that day annexed thereto. These financial statements are the responsibility of the Academy's Management. Our responsibility is to express an opinion on these financial statements based on our Audit.

We conducted our Audit in accordance with auditing standards generally accepted in India. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An Audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An Audit also includes assessing the accounting principles used and significant estimates made by the management, as well as evaluating the overall financial statement presentation. We believe that our Audit provides a reasonable basis for our opinion.

Subject to the above :

- i) We have obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purpose of our audit.
- ii) In our opinion, proper books of account as required by the law have been kept by the Academy so far as appears from our examination of those books.
- iii) The Balance Sheet and the Income and Expenditure Account dealt with by this report are in agreement with the books of account.
- iv) In our opinion, the Balance Sheet and Income and expenditure Account dealt with by this report comply with the accounting standards.
- v) In our opinion and to the best of our information and according to the explanations given to us, the said accounts, read with accounting policies and Notes to Accounts thereon, give a true and fair view in conformity with the accounting principles generally accepted in India :
  - a) In the case of Balance Sheet, of the state of affairs of the Academy as at March 31, 2016; and
  - b) In the case of Income and Expenditure Account, of the surplus of Income over Expenditure of the Academy for the year ended on March 31, 2016.

PLACE: NEW DELHI  
DATED: June 16, 2016

For MEHRA MALHOTRA & CO  
CHARTERED ACCOUNTANTS

-Sd-  
(ARUN KUMAR MEHRA)  
PARTNER  
(Membership No. 80827)  
(Reg. No. : 001052 N)

## BALANCE SHEET AS AT 31ST MARCH, 2016

(Amt in Rs)

|                                            | As at<br>31.3.2016  | As at<br>31.3.2015  |
|--------------------------------------------|---------------------|---------------------|
| <b>CORPUS/CAPITAL FUND AND LIABILITIES</b> |                     |                     |
| CORPUS/GENERAL FUND                        | 10,22,66,300        | 9,15,93,266         |
| earmarked funds                            | 1,60,76,076         | 1,42,19,717         |
| CURRENT LIABILITIES AND PROVISIONS         | 1,75,41,099         | 69,82,160           |
| <b>TOTAL</b>                               | <b>13,58,83,475</b> | <b>11,27,95,143</b> |
| <b>ASSETS</b>                              |                     |                     |
| FIXED ASSETS                               | 3,90,10,268         | 4,38,07,710         |
| INVESTMENTS                                | 8,30,88,443         | 5,82,57,086         |
| CURRENT ASSETS, LOANS & ADVANCES           | 1,37,84,764         | 1,07,30,347         |
| <b>TOTAL</b>                               | <b>13,58,83,475</b> | <b>11,27,95,143</b> |

As per our report of even date

On behalf of the Council:

For MEHRA MALHOTRA & CO  
CHARTERED ACCOUNTANTS

Sd/-  
(Dr BN Suresh)  
President

Sd/-  
(ARUN KUMAR MEHRA)  
Partner  
(Membership No. 80827)  
(Reg. No. : 001052N)

Sd/-  
(Dr Sanak Mishra)  
Vice-President  
(Finance & Establishment)

Sd/-  
(Brigadier Rajan Minocha)  
Executive Director

Sd/-  
(Bhuwan Adhlakha)  
Manager (F & A)

Place : New Delhi  
Dated : June 16, 2016



## INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2016

(Amt in Rs)

|                                                              | Current Year<br>2015-16 | Previous Year<br>2014-15 |
|--------------------------------------------------------------|-------------------------|--------------------------|
| <b>INCOME</b>                                                |                         |                          |
| Grants and Sponsorships                                      | 7,45,55,352             | 4,92,01,295              |
| Delegate Registration Fees etc.                              | 20,01,310               | 7,00,440                 |
| Transfer from General Fund                                   | -                       | 8,46,552                 |
| <b>TOTAL</b>                                                 | <b>7,65,56,662</b>      | <b>5,07,48,287</b>       |
| <b>EXPENDITURE</b>                                           |                         |                          |
| (1) Engineering Activities                                   |                         |                          |
| i) Seminars / Conferences / Symposiums / Workshops           | 52,56,387               | 44,47,644                |
| ii) INAE Chair, Distinguished Professors & Mentoring Schemes | 82,56,334               | 66,32,746                |
| iii) Research Studies/ Projects                              | 62,80,382               | 21,89,286                |
| iv) INAE Awards                                              | 34,86,495               | 34,37,017                |
| v) Academia-Industry Interaction                             | 6,81,944                | 14,35,238                |
| vi) INAE Forums                                              | 4,25,236                | 2,27,098                 |
| vii) Academy Meetings                                        | 21,50,727               | 25,36,912                |
| viii) Annual Convention                                      | 27,50,800               | 33,82,365                |
| ix) International Affairs                                    | 24,95,477               | 31,87,619                |
| x) INAE Publications                                         | 37,97,287               | 11,40,132                |
| xi) Financial Assistance for Engineering Activities          | 7,53,447                | 6,00,000                 |
| xii) CAETS 2015 Global Event                                 | 1,15,63,740             | 9,52,673                 |
| xiii) INAE Digital Knowledge & Research Centre Repository    | 10,51,080               | -                        |
| (2) Establishment expenses                                   | 1,66,57,175             | 1,49,61,725              |
| (3) Depreciation                                             | 49,70,744               | 55,53,369                |
| (4) Loss on disposal of Assets                               | -                       | 64,463                   |
| (5) Transfer to General Fund & Corpus Fund                   | 59,79,407               | -                        |
| <b>TOTAL</b>                                                 | <b>7,65,56,662</b>      | <b>5,07,48,287</b>       |

As per our report of even date

On behalf of the Council:

For MEHRA MALHOTRA & CO  
CHARTERED ACCOUNTANTS

Sd/-  
(Dr BN Suresh)  
President

Sd/-  
(ARUN KUMAR MEHRA)  
Partner  
(Membership No. 80827)  
(Reg. No. : 001052N)  
Place : New Delhi  
Dated : June 16, 2016

Sd/-  
(Dr Sanak Mishra)  
Vice-President  
(Finance & Establishment)

Sd/-  
(Brigadier Rajan Minocha)  
Executive Director

Sd/-  
(Bhuwan Adhlakha)  
Manager (F & A)



# **INAE OFFICE and DKRC**

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