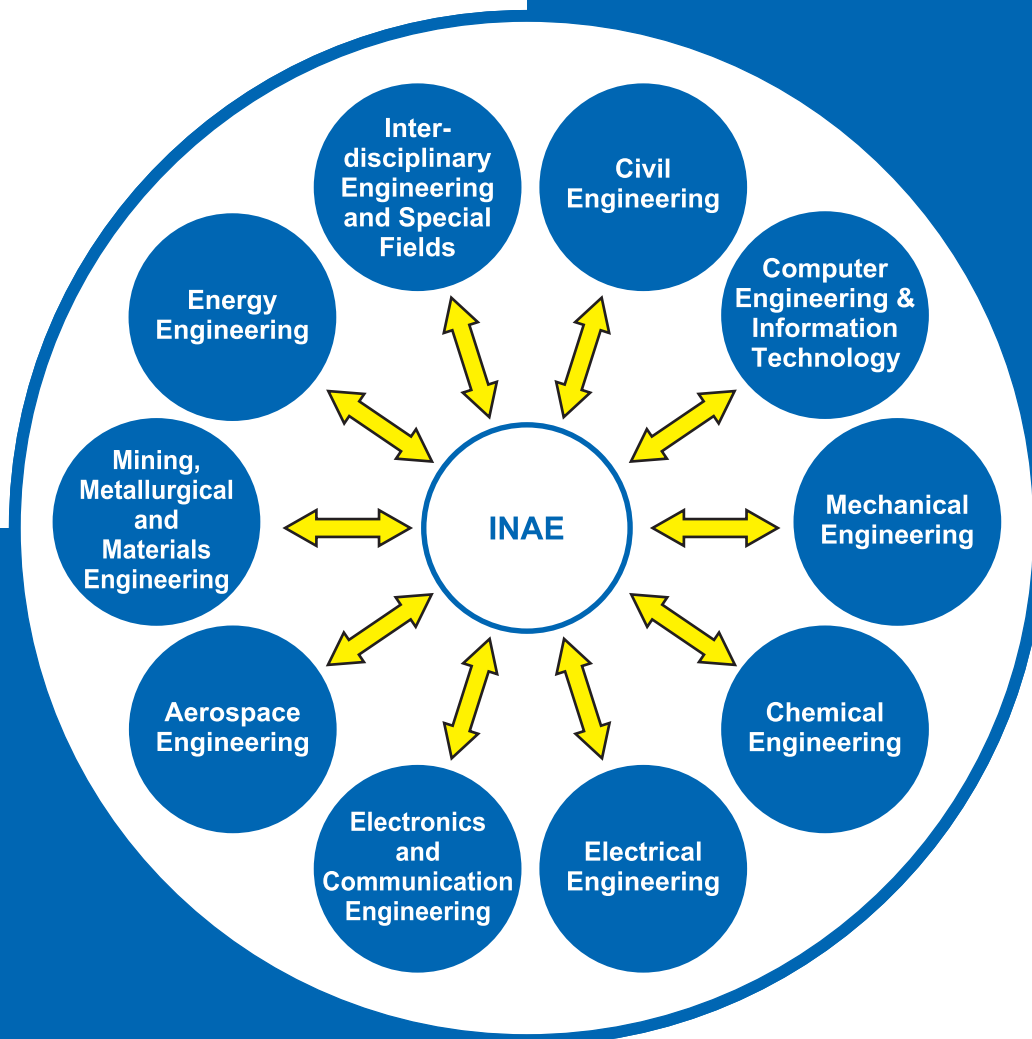




# ANNUAL REPORT 2014 - 15



*Indian National Academy  
of Engineering*



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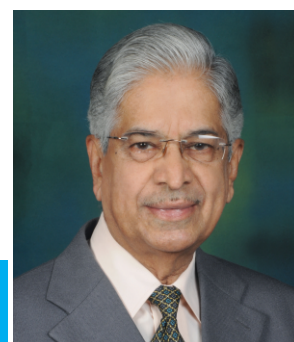


# ANNUAL REPORT 2014 - 15



Indian National Academy  
of Engineering





## Foreword

It is with great pleasure I wish to express my thoughts and communicate with the eminent Fellows, Foreign Fellows and Young Associates by recapitulating my experiences since I assumed the office of President, INAE this year. It is with humility that I assumed the helm of affairs of a pool of immense talent which has been ably steered by the Past Presidents and office bearers. I strongly believe that our Fellows represent the luminaries of the engineering community and all initiatives, new and ongoing, are as a result of their deep commitment and sincerity. It is my conviction that as an engineering Academy we need to reach out to the stake holders, policy makers with our study reports and our recommendations on various issues of National importance with appropriate engineering solutions. To meet this objective we strongly felt that we need to orient our research studies, activities and our programmes with the thrust areas of the Government. This will help us to generate elegant engineering solutions to many of the problems faced by the Country and reach out to the policy makers. Considering these factors serious efforts, have been made to establish appropriate links and to enhance our interactions with the relevant Government agencies and stakeholders.

Undoubtedly the initiatives of the Academy have increased manifold in the recent past and we have expanded our outreach in the national and international fora. INAE has undertaken a number of new initiatives in terms of commencing new programmes and conduct of unique events. To increase the interaction with industry, an MOU between INAE and Confederation of Indian Industry (CII) was signed and actions are on to organize a joint conference soon in one of the areas of National importance. This MOU helps the Academy to enhance the high-level interactions between research organizations, government and industry to prepare a road-map for future technologies and participation of members from both sides in conferences, summits, workshops, symposiums, interactive meetings, round-tables etc. This epitomizes a start for greater involvement of eminent engineers from industry in programmes of INAE.

The Engineers Conclave initiated in 2013, to be organized jointly with Department of Atomic Energy (DAE)/ Department of Space (DOS)/ Defence Research & Development Organization (DRDO)/ Council of Scientific and Industrial Research (CSIR) and other major Scientific Establishments of the Government on rotation basis, each year, has indeed met the objective of providing a platform for engineers from allied fields to meet, deliberate and has resulted in framing right engineering solutions to some of the pertinent issues of national importance. The second Engineers Conclave 2014 was organized jointly with Indian Space Research Organisation (ISRO) from Oct 30 to Nov 1, 2014 at Bangalore. The two themes for Engineers Conclave-2014 were “Emerging Space Applications” and “Technologies for Hill Regions”. Pertinent, actionable recommendations have emanated from the deliberations at the conclave. We are leaving no stone unturned to progress these actionable recommendations of both the Engineers Conclave held so far and reach out to the appropriate policy agencies.

Another new venture of the Academy is the creation of the Digital Knowledge Resource Centre (DKRC) which has been set up during 2014 at INAE Office, Vishwakarma Bhawan, New Delhi. A facility for



access to e-journals from reputed foreign publishers through DST-NISCAIR e-consortium has been created which is being transmitted to the Fellowship by assigning unique userids. During the next phase a repository of Research work / Engineering contributions and bibliographic details including abstracts of publications of individual INAE Fellows are being created so that the same can be made available to other Fellows of INAE. I am happy to note that a large number of Fellows are beginning to utilize this facility and have volunteered to share their accomplishments with the engineering community by contributing to this repository.

Having signed MoUs with a number of CAETS Member Academies, INAE has initiated programs on specific areas which would be progressed further so as to achieve meaningful collaboration on the identified topics. Based on the collaboration with National Academy of Technology, France (NATF) in the area of Healthcare Technologies, the second INAE-NATF Workshop on “Technology and Healthcare” with emphasis on Affordable Healthcare & Bioinformatics was organized at Bangalore which has resulted in meaningful interactions and collaborations between the two Academies and countries. Another major initiative in the area of Clean Coal Technologies with Canadian Academy of Engineering has been undertaken by INAE. This has resulted in holding of the Canadian Academy of Engineering (CAE) – INAE Workshop on Clean Coal Technologies in December 2012 at New Delhi in which 25 experts from India and Canada participated. Subsequent to the workshop, several important areas were identified for CAE-INAE joint initiatives and the 2<sup>nd</sup> CAE-INAE workshop for stakeholders in Clean Coal Technologies is being held in Toronto, Canada in July 2015.

It is a matter of pride that this year the International Council of Academies of Engineering and Technological Sciences (CAETS) Annual Meetings 2015 and Convocation on ‘Pathways to Sustainability: Energy, Mobility and Healthcare Engineering’ will be held on Oct 12-15, 2015 at Hotel Ashok, New Delhi with INAE as the host Academy. Dr Baldev Raj, Immediate Past President, INAE has also assumed the appointment of President, CAETS for the year 2015. It is envisaged that representatives from 26 Member Academies of CAETS would be participating in this event. One-third of the strength of the Convocation is envisaged to be comprising of young engineers below the age of 45 years which is a new proposal initiated by INAE. We seek the active participation of all Fellows of INAE in this global mega event for engineers.

It is always our endeavour and focus to involve maximum Fellows in the activities of the Academy through the various forums, research schemes, seminars/conferences/ round tables, research studies and also the strengthening of the Local Chapters. Needless to mention that the Fellows represent a reservoir of intense intellectual capacity and professional expertise and their working in consonance would greatly contribute to the success of all our programmes. The ultimate goal of this exercise is to make a difference and achieve excellence in the practice and advancement of the engineering profession in the country. This shall also be a step towards enhancing the image of engineers and improve their visibility by addressing the engineering challenges on issues of topical interest. Let us hope that our endeavours shall mark the dawn of a new era of a more technologically advanced India in the coming decades.

I shall always look forward to your valuable suggestions and guidance on all matters of the Academy and I promise to utilise your inputs for the greater progress of the Academy.

I wish you unparalleled success, unique laurels and accomplishments in your careers and professional pursuits in the coming years.

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.

- To promote and advance the practice of engineering and technology and the related sciences and disciplines and their application to problems of national importance.
- To disseminate information on all matters pertaining to 'Engineering' by publishing proceedings, journals, memoirs and by holding meeting, lectures, seminars, symposia etc.
- To interact with professional bodies, engineering and scientific academies etc. already established or as may be established in future in India and abroad.
- To represent at all academic forums, research and development activities on 'Engineering' in India and abroad.
- To promote the National Policy on Education of the Government of India.





- To offer the Government of India, the Local Governments and others, facilities for conferring with and ascertaining the views of 'Engineers' pertaining to 'Engineering' and to confer with the said Governments and others in cooperation with fraternal professional bodies.
- To encourage inventions, investigations and research and promote their applications for development of both organised and unorganised sectors of the national economy.
- To institute and establish Professorship, Fellowship, Studentship, Scholarship, Awards and other benefactions and to grant Certificates of Competency and Charter whether under any Act of Government of India or otherwise howsoever.



## INAE Governing Council for the Year 2015



**President** : Dr. BN Suresh, Vikram Sarabhai Distinguished Professor,  
ISRO HQRS., Bangalore



**Immediate Past President** : Dr. Baldev Raj, Director, National Institute of  
Advanced Studies (NIAS), Bangalore



**Vice-President** : Dr. KV Raghavan, INAE Distinguished Professor,  
*(Academic, Professional & International Affairs)* Reaction Engineering Laboratory,  
Indian Institute of Chemical Technology, Hyderabad



**Vice-President** : Dr. Sanak Mishra, Formerly Managing Director,  
*(Finance & Establishment)* Rourkela Steel Plant and Director, Steel Authority of India Ltd.(SAIL);  
Vice-President, ArcelorMittal and CEO India Project.



**Vice-President** : Prof. Indranil Manna, Director,  
*(Fellowship, Awards & Corporate Communication)* Indian Institute of Technology Kanpur.



**Chief Editor of Publications** : Dr. Purnendu Ghosh, Executive Director,  
Birla Institute of Scientific Research, Jaipur



**Members**  
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  | : Prof. Sanjay Mittal, Department of Aerospace Engineering, Indian Institute of Technology Kanpur  |
|    | Engg Section-VIII   | : Dr. CG Krishnadas Nair, Honorary President, SIATI; Chancellor, Jain University, Bangalore  |
|    | Engg Section-IX   | : Mr. HL Bajaj, Formerly Technical Member, Appellate Tribunal for Electricity, New Delhi   |
|    | Engg Section-X  | : Prof. Prasun K Roy, The Tata innovation Fellow & Principal Investigator, Indian Brain Grid, National Neuro-Imaging Facility, National Brain Research Centre, Gurgaon |
|    | Ministry of Science & Technology                                  | : Dr. V Rao Aiyagari, Advisor, Public Health Foundation of India, New Delhi  |
|   | Indian National Science Academy                                   | : Prof. Anurag Sharma, Physics Department, Indian Institute of Technology, Delhi   |
|   | Asiatic Society   | : Prof. Dilip Kumar Basu, Former Vice-Chancellor, University of Burdwan, W.B. and Tripura University   |
|  | Indian Academy of Sciences  | : Prof. Manindra Agrawal, Department of Computer Science & Engg., Indian Institute of Technology, Kanpur.  |
|  | National Academy of Sciences (India)                              | : Prof. SC Dutta Roy, Formerly Professor, Dept of Electrical Engineering, Indian Institute of Technology, Delhi.   |
|  | Institution of Electronics and Telecommunication Engineers (IETE) | : Dr. Surendra Pal, Vice Chancellor, Defence Institute of Advanced Technology (DIAT) (Deemed University), Pune   |
|  | The Institution of Engineers (India)                              | : Dr. BVA Rao, Chairman, NDRF, Institution of Engineers (India), Bangalore   |
|  | Confederation of Indian Industry (CII)                            | : Mr. Anjan Das, Executive Director – Technology, Confederation of Indian Industry (CII), New Delhi  |



## INAE Committees

### Sectional Committees

Each Sectional Committee has ten members. To ensure maximum participation of members, the strength of the Sectional Committees to be increased to twelve in a phased manner. Accordingly, one member in each Sectional Committee to be increased in the next three years. The composition of the ten Sectional Committees are given below.

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

##### Convener

Prof. CVR Murty

##### Members

Dr. Nagesh R Iyer  
Dr. S Chowdhury  
Dr. VN Sharda  
Prof. PL Bongirwar  
Mr. N Raghavan  
Prof. DN Singh  
Prof. Abhijit Mukherjee  
Prof. Sriman Kumar Bhattacharyya  
Prof. PC Basu

#### Sectional Committee-II (Computer Engineering & Information Technology)

##### Convener

Prof. Y Narahari

##### Members

Prof. Vijay Chandru  
Prof. Manindra Agarwal  
Prof. Sanghamitra Bandyopadhyay  
Prof. Rajeev Sangal  
Dr. S Ramesh  
Prof. Pankaj Jalote  
Prof. C Pandu Rangan  
Prof. JR Haritsa  
Mr. PS Dhekne

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

##### Convener

Prof. ML Munjal

##### Members

Prof. T Sundararajan  
Prof. SK Das  
Prof. JH Arakeri  
Prof. K Muralidhar  
Prof. K Ramesh  
Prof. Kshitij Gupta  
Dr. Sekhar Majumdar  
Dr. R Mahadevan  
Prof. BK Dutta

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

##### Convener

Prof. DV Khakhar

##### Members

Dr. R Mukhopadhyay  
Mr. KV Subramaniam  
Prof. Deepak Kunzru  
Dr. BM Reddy  
Dr. Vivek V Ranade  
Dr. Rajiv I Modi  
Mr. DP Misra  
Mr. MB Lal  
Prof. AB Pandit



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

**Convener**

Prof. B Bandyopadhyay

**Members**

Mr. Mukesh Bhandari  
Prof. Soumitro Banerjee  
Prof. VS Borkar  
Prof. K Gopakumar  
Dr. Chandan Chakraborty  
Dr. M Arunachalam  
Mr. Manjit Singh  
Dr. Sukumar Mishra  
Prof. KR Rajagopal

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

**Convener**

Prof. Anurag Sharma

**Members**

Dr. PV Ananda Mohan  
Dr. VK Agrawal  
Dr. BB Biswas  
Dr. JN Roy  
Prof. Souvik Mahapatra  
Dr. SD Sherlekar  
Prof. Navakanta Bhat  
Prof. V Ramgopal Rao  
Prof. Amitava Dasgupta

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

**Convener**

Dr. V Adimurthy

**Members**

Prof. Ranjan Ganguli  
Prof. C Venkatesan  
Dr. AR Upadhya  
Mr. GS Reddy  
Prof. RI Sujith  
Prof. S Suryanarayan  
Prof. B Dattaguru  
Mr. S Chetty  
Mr. VR Katti

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

**Convener**

Dr. BK Mishra

**Members**

Dr. AK Bhaduri  
Prof. BS Murty  
Dr. T Balakrishna Bhat  
Dr. U Ramamurthy  
Dr. HS Maiti  
Dr. GK Dey  
Dr. SV Kamat  
Dr. Shrikant V Joshi  
Dr. AK Gupta

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

**Convener**

Dr. Ajay Mathur

**Members**

Mr. RN Jayaraj  
Dr. RS Yadav  
Mr. Anil V Parab  
Mr. Pradeep Chaturvedi  
Mr. R Natarajan  
Dr. RK Singh  
Prof. C Balaji  
Mr. PK Wattal  
Dr. J Narayana Das

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

**Convener**

Prof. MS Ananth

**Members**

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Prof. PK Roy  
Prof. Chandra Shakher  
Dr. V Jayaraman  
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Prof. P Munshi  
Prof. M Sharan  
Dr. J Raghava Rao  
Prof. Rudra Pratap



## Other Committees

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#### ***Chairman***

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#### ***Members***

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Dr. Sanak Mishra

Prof. Indranil Manna

Mr. VK Agarwal

Dr. CR Prasad

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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Dr. Baldev Raj

Dr KV Raghavan

Dr Sanak Mishra

Prof. Indranil Manna

Prof BS Murty

Prof Sanghamitra Bandyopadhyay

Prof Pradip Dutta

Prof Manoj K Tiwari

Prof Sanjay Mittal

Dr Prasun K Roy

Brig Rajan Minocha

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#### ***Members***

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Prof. Indranil Manna

Dr. Purnendu Ghosh

Mr. VK Agarwal

Prof. Sanjay Mittal

Prof. Sukumar Mishra

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Prof. S Narayanan

Dr. K Bhanu Sankara Rao

Mr. VP Sandlas

Prof. AB Bhattacharyya

Prof. Manindra Agrawal

Prof. BS Murty

### **Selection Committee – Young Engineer and Innovative Student Projects Awards**

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#### ***Members***

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Prof. Santanu Chaudhury

Prof. Manindra Agrawal

Prof. AB Bhattacharyya

Prof. S Narayanan

Dr. Purnendu Ghosh

Dr. M Arunachalam

Prof. Sukumar Mishra

Dr. Rajeev Shorey

Prof. Nagesh R Iyer

Dr. AK Gupta

Prof. BS Murty



Prof. Prasenjit Sen  
Prof. Kehar Singh  
Prof. Sanjay Mittal  
Dr. AR Upadhy  
Prof. M. Sharan

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##### ***Chairman***

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##### ***Members***

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Prof. Pankaj Jalote  
Prof. RK Shevgaonkar  
Prof. SK Sarangi  
Dr. Ajay Mathur  
Prof. Nagesh R Iyer  
Prof. Manindra Agrawal  
Prof. Sanjay Mittal  
Prof. BS Murty  
Prof. Sukumar Mishra  
Dr. SP Borkar – AICTE  
Ms Shalini Sharma – CII

##### ***DVP Scheme***

Prof. AB Bhattacharyya  
Dr. CR Prasad  
Prof. Manoj K Tiwari

##### ***Teachers Research***

##### ***Fellowship Scheme***

Prof. SN Shome – Rep., CSIR  
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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##### ***Chairman***

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##### ***Members***

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Dr. YP Anand

Dr. CR Prasad  
Mr. AK Anand  
Mr. KP Singh  
Mr. SC Gupta  
Mr. VN Mathur  
Mr. AK Gupta

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##### ***Members***

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Dr U Kamachi Mudali  
Prof B S Murty  
Prof Santanu Chaudhury  
Prof Sriman K Bhattacharyya  
Prof Giridhar Madras

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##### ***Chairman***

Dr. Baldev Raj

##### ***Members***

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Dr. RR Sonde  
Prof. SS Murthy  
Dr. Ajay Mathur  
Dr. Purnendu Ghosh

#### **Forum on Engg Interventions for Disaster Mitigation**

##### ***Chairman***

Dr. RK Bhandari

##### ***Members***

Prof. Prem Krishna  
Prof. DV Singh  
Prof. SS Chakraborty  
Prof. CVR Murty  
Prof. DK Paul  
Ms Alpa Sheth  
Mr. VK Agarwal



## Academy Activities

### Seminars/Workshops/Conferences –National

#### National Frontiers of Engineering (NatFOE-8) Symposium

National Frontiers of Engineering Symposium is the annual flagship event of INAE. The 8<sup>th</sup> National Frontiers of Engineering Symposium (NatFoE-8) was jointly organized by INAE and IIT Gandhinagar on Sep 5-6, 2014 at IIT Gandhinagar. Prof. Sudhir K Jain, FNAE, Director, IIT Gandhinagar was the Chair and Dr. Pranab Mohapatra was the Coordinator of the Symposium. The symposium had “Safety” as its main theme with four sub-themes were: Earthquake engineering and safety; Process and fire safety; Road safety and Cognition and safety.

Prof. Sudhir K Jain, FNAE delivered the Welcome Address during the Inaugural Session and highlighted the importance of imbibing the practice of following safety norms in industry and also in all walks of life. Four Keynote Talks were held during the symposium two on each day followed by three parallel sessions on “Earthquake and Safety”; “Road Safety” and “Process and Fire Safety”. The 31 presentations were well appreciated by the participants of the respective groups. The key attraction was the four keynote presentations which were attended by all participants. In addition, there were group discussions where the participants of the respective groups debated on the current needs in India.

The event concluded with the valedictory function wherein Prof. J. Krishnan from INAE addressed the participants. The event was attended by more than 70 experts from academia, industry and R&D besides students and research scholars of IIT Gandhinagar. The participants and speakers included experts from IIT Gandhinagar, IIT Madras, IIT Delhi, Bengal Engineering and Science University, Shibpur; IIT Bhubaneswar; NIT Rourkela, IIT Kharagpur; M/s Final Mile; Heriot-Watt University; IIT Kanpur; SJ College of Engineering; IIT Bombay; IIT Roorkee; NIT Patna; NIT Surat; UP PWD; Gitam University; CLRI; M/s fields of View; Kerala MVD etc.



*Prof. Sudhir K Jain, Director, IIT Gandhinagar and Chair of NatFOE8 delivering the Welcome Address*





## Engineers Conclave

INAE has taken an initiative of organizing an annual mega event of engineers viz “Engineers Conclave” starting from the year 2013. This event is organized jointly with Department of Atomic Energy (DAE)/ Department of Space (DOS)/ Defence Research & Development Organization (DRDO)/ Council of Scientific and Industrial Research (CSIR) on rotation basis each year.

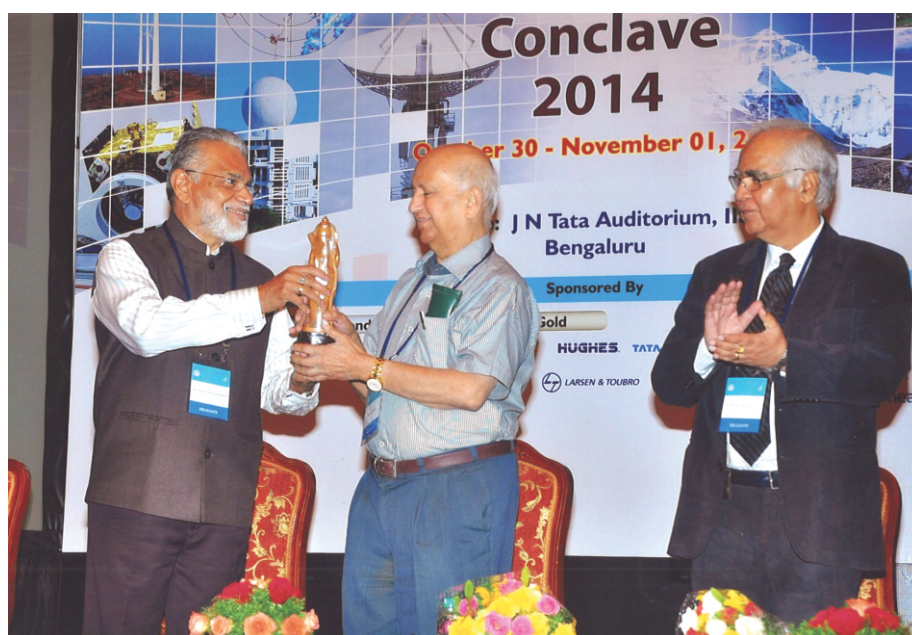
The objective of the Engineers Conclave is to provide a platform for engineers from allied fields to meet, deliberate and recommend right engineering solutions to some of the pertinent issues of national importance. It is also an endeavour of INAE to reach out to the appropriate policy agencies with the recommendations emerging out of the Conclave.

The first “Engineers Conclave” was held jointly with DRDO at New Delhi in 2013. Shri Pranab Mukherjee, Hon’ble President of India was the Chief Guest during the Inaugural Function. The themes of the Conclave were “Production and Manufacturing in Aerospace” and “Engineering Interventions in Sunderbans”. The recommendations of the Conclave are being progressed with the concerned Government Departments/ Agencies.

The second Engineers Conclave 2014 was organized jointly with Indian Space Research Organisation (ISRO) from Oct 30 to Nov 1, 2014 at JN Tata Auditorium, National Science Seminar Complex, Indian Institute of Science (IISc), Bangalore. Dr. K Radhakrishnan, Chairman, Space Commission and Secretary, Department of Space was the Chair for EC 2014 with Dr. Baldev Raj, President, INAE as Co-Chair. The chief guest for Engineers Conclave 2014 was Prof. U R Rao, Chairman, PRL Council, Bangalore, Former Chairman, Space Commission.

The two themes for Engineers Conclave-2014 were “Emerging Space Applications” and “Technologies for Hill Regions”. Theme-1 on “Emerging Space Applications” was coordinated by ISRO and Theme-2 on “Technologies for Hilly Regions”, was coordinated by INAE. Shri AS Kiran Kumar, Director, Space Application Centre (SAC), Ahmedabad was the Coordinator for Theme 1 on “Emerging Space Applications” and Dr. Ashwagosh Ganju, Director, Snow and Avalanche Study Establishment, Chandigarh was the Coordinator for Theme-2 on “Technologies for Hilly Regions”.

The sessions under Theme 1 on “Emerging Space Applications” were : (i) Energy, (ii) Climate, (iii) Weather, (iv) Early warning and (v) Communication and Navigation. Similarly, the sessions under Theme 2 on “Technologies for Hilly Regions” were (i) Mountain Weather, (ii) Gravity flows and Associated Hazards, (iii) Earthquake Hazards in Himalayan regions and its Mitigation, (iv) Glacier, snow cover, Water Management & Energy in Hill region and (v) Communications for Hazards condition in Hill regions. These two important themes focused on cutting edge solutions and specific recommendations for development by the concerned agencies are under preparation. Eminent experts and senior functionaries from National and State Centres/ Departments/ Units, Academia, Industry, ISRO and INAE participated in large numbers to deliberate on the themes of the EC-2014.



*Dr. K Radhakrishnan, Chairman, Space Commission and Secretary, Department of Space and Chair, EC2014 felicitating Dr. UR Rao*

The event had an Inaugural Session followed by two parallel sessions on respective themes. Each theme had five technical sessions followed by the Panel Discussion at the end of each theme. There were three plenary talks which were delivered by Dr. Saumitra Chaudhuri, Former Member, Economic Advisory Council to PM; Lt Gen A T Parnaik, SM VSM, Director General, Border Roads and Dr Shailesh Nayak, Secretary, Ministry of Earth Sciences, New Delhi.

There was a parallel meeting with key functionaries of the Government/Secretaries to Govt. of India to discuss the actual issues on the ground, the live problems and risk areas, so that the futuristic technological breakthroughs are achieved that are useful for the society in general and hilly areas in particular.

The event was concluded with the Valedictory Session which was chaired by Dr. K Kasturirangan, Chairman, Knowledge Commission, Government of Karnataka.

### **Workshop on Automotive Recycling Research**

A workshop on “Automotive Recycling Research” was organized on March 12, 2015 at India International Centre, New Delhi. Capt. NS Mohan Ram was the Coordinator of this workshop. The objective of the workshop was to receive inputs from the stakeholders and experts for finalization of the report on the Research Study of “Development of Scientific Recycling of End of Life Automobiles in India and the Role of Research and Development” supported by the office of Principal Scientific Adviser to the Government of India. The research study group comprises of Capt. NS Mohan Ram as the Principal Investigator with Mr. Sugumar, Dy. Director Central Institute of Plastic Engineering and Technology (CIPET), Chennai and Dr. Basudam Adhikari, Professor of Material Sciences at IIT Kharagpur, as members.

The workshop was presided over by Dr. R Chidambaram, Principal Scientific Adviser to the Government of India and Dr. BN Suresh, President, INAE. The workshop was attended by the stakeholders and experts from industry, R&D and concerned Ministries/Government Departments. Various recommendations have emerged during the brainstorming session and the same are being compiled for incorporation in the final report.



## **Seminars/Workshops/Conferences –International**

### **INAE and RAEng, UK Joint Workshop on Distributed Manufacturing Opportunities for Growth (Perspectives from the UK and India)**

INAE delegation led by Dr Baldev Raj, President, INAE and Dr V Bhujanga Rao, FNAE; Prof N Viswanadham, FNAE; Dr P Chellapandi, FNAE; Prof Manoj K Tiwari, FNAE; Dr Bhanu Prasad, Vision Specialist, Matrix Vision GmbH, Germany; Dr B Santhosh, Head, Structural Design Section, Vikram Sarabhai Space Centre, Thiruvananthapuram; Mr BH Laxmesh, Head, Precision Manufacturing Facility, Larsen & Toubro, Coimbatore; Dr Jeffrey Tew, Chief Scientist, Head, TCS Innovation Labs, Cincinnati and Mr Shankar Subramanian, Head, Manufacturing Execution Systems, Tech Mahindra, Bangalore as Members participated in the joint workshop between INAE and RAEng, UK on “Distributed Manufacturing -Opportunities for Growth (Perspectives from the UK and India)” held on June 16-18, 2014 at London, UK.

The broad topics covered during the joint workshop were : UK and India Perspectives on Distributed Manufacturing – the Present and Future Prospects; Distributed Manufacturing in Aeronautical and Automotive Sectors; Intelligent Manufacturing Design; Implications of Distributed Manufacturing for Industrial Innovation – R&D to Service and Identification of Future Strategies and Opportunities for Long Term collaboration between UK and India. Visits to Institute of Manufacturing at Cambridge University, Virtual Innovation Centre at Tata Jaguar Land Rover and Manufacturing Technology Centre (MTC) at Coventry have given very good exposure to all delegates on current status on the subject. It was planned to bring out a ‘Way Forward’ for the two Academies which would be based on the recommendations emanating from the presentations by speakers, deliberations and the panel discussion held during the workshop. Specific efforts would be made to build academic-research-industry collaborations on topics of mutual interest and enable exchange of young leaders of the two countries on the topic of advanced manufacturing, which is of high importance to India and UK.

### **Joint Symposium on Advanced Manufacturing, Logistics and Urban Development: New Perspectives for International Development Cooperation? with National Academy of Science and Engineering (acatech), Germany**

INAE has been undertaking several collaborative programmes with National Academy of Science and Engineering (acatech), Germany on “Advanced Manufacturing”. The first Indo-German Workshop on “Big data for Engineering Applications” was held on March 14-15, 2013 at Berlin, Germany. This was followed by the second joint workshop on “Strategies and Concepts for Advanced Manufacturing for Big Data” under the auspices of Indo-German Science and Technology Centre (IGSTC) held on Jan 23-24, 2014 at India International Centre, New Delhi.





*Dignitaries on the dais during Inaugural Session of the event held at New Delhi*

The third joint symposium on “Advanced Manufacturing, Logistics and Urban Development: New Perspectives for International Development Cooperation?” with acatech was held on Sept 3-4, 2014 at India International Centre. During the symposium, studies in the field of Advanced Manufacturing, Logistics and Urban Development by Prof. Manoj Tiwari, FNAE, IIT Kharagpur; Prof. N Viswanadham, FNAE, IISc and Prof. TG Sitharam, IISc with respect to Indian scenario and by Prof. Fritz Klocke, Dr. Tobias Hegmanns and Prof. Bernhard Müller with respect to German scenario were presented with a aim to identify joint collaborative activities to be undertaken between the two countries.

### **INAE-NAE Joint Symposium on Engineering Education in The 21st Century held at NAE, Washington DC, USA**

“INAE-NAE Symposium on ‘Engineering Education’ for the 21st Century” was held in Washington DC, USA during December 18-19, 2014. Prof Indranil Manna and Prof Venkatesh Narayanamurti were the Coordinators from INAE and National Academy of Engineering (NAE), USA respectively. The INAE delegation comprising of Prof Indranil Manna, Prof Amlan Jyoti Pal, Prof T Pradeep, Dr Rajeev Shorey, Prof BS Murty, Prof V Ramgopal Rao, Prof Deepak Phatak, Mr. Balaji Ganapathy of TCS, USA and Dr Leo Kempel of Michigan State University, USA participated in the symposium. A visit to Olin College and MIT was organized on Dec 16, 2014 and to Harvard University on Dec 17, 2014. The symposium comprised of presentations in six Technical Sessions on Grand Challenges I, Mass Education and Self Learning Projects and Strategy in India and USA, Thematic Grand Challenge Initiatives in India, Grand Challenge Initiatives in USA, Education Policy on Grand Challenges and Concluding Session. There was a panel discussion on the topic “How to Implement Global Grand Challenge Scholars Program in India and USA using Conventional and Mass Education Platforms”. The recommendations of the symposium have since been finalized and as a follow-up activity to this Symposium an INAE-NAE symposium on “Engineering Education” is being planned to be held at Kanpur/Delhi from Oct 19-21, 2015.



## INAE-NATF collaboration on ‘Technology and Healthcare’

The first joint Workshop with National Academy of Technology, France (NATF) on “Technology and Healthcare” with emphasis on Bioinformatics was held on 15-16 October, at Évry-Génopôle, France. The second INAE-NATF Workshop on “Technology and HealthCare” with emphasis on Affordable Healthcare & Bioinformatics was organized from April 15-17, 2015 at National Institute of Advanced Studies (NIAS), Bangalore. Dr. Rajeev Shorey and Prof. PE Bost are the Coordinators of this event from INAE and NATF respectively. The aim of the workshop is to discuss the increasingly technology driven progress in healthcare sector. The two and a half day workshop included current and important topics in healthcare, bioinformatics and related areas.



*Participants in the INAE-NATF workshop conducted at NIAS, Bangalore*



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

### **School on Characterisation and Conservation of Archaeological Objects**

A five Day “School on Characterisation and Conservation of Archaeological Objects”, targeting students and faculty in archaeology, culture and archaeomaterials, was organized at CSIR-NML by INAE Study Group on Indian Engineering Heritage (Metallurgy) during October 13-17, 2014. The school covered classroom lectures by leading experts in various areas of conservation and characterisation, experimental demonstrations and visual displays.

The list of topics/themes covered were : Characterisation and conservation of archeological objects (general); Microstructure in metallurgical processing; Conservation and characterization of iron objects; Conservation and characterization of brass/bronze objects; Authenticity test of archeological objects; Characterisation techniques - chemical characterization (trace to bulk), Microstructural characterisation (Optical and SEM), X-ray based techniques (XRF and XRD), Nondestructive (NDT) techniques, Carbon dating; Sand structure, clays and clay pottery objects; Gems and gemstones in antiquity; Conservation of stone and archeological monuments; and Conservation of paintings and wooden objects.

The purpose of the school was to inspire and bring the youngsters to the fore for the long term sustainability and growth of the discipline. The selection of the participants was done on national basis. 42 selected participants (inclusive of two from Jamshedpur City) covering 20 states of the country representing 28 organizations participated in the deliberations. The notable organizations among them were - Archaeological Survey of India, Dehradun; Heras Institute of Indian History & Culture, Mumbai; MRC & MCC, Patna Museum, Patna; Directorate of Archaeology, Assam, Mizoram, Manipur; Don Bosco Centre for Indigenous Cultures, Shillong, Meghalaya; The Maharaja Sayajirao University of Baroda, Vadodara; National Museum Institute, New Delhi; Museums & Heritage Department, Bellary, Karnataka; Kurukshetra Panorama & Science Centre, Haryana; Birla Industrial & Technology Museum, Kolkata; Department of Archaeology, Museums & Heritage, Mysore; Bihar Museum, Patna; Conservator in Private Practice, Pune; Government Museum, Bidar, Karnataka; Pondicherry University, Pondicherry; Banaras Hindu University, Varanasi; Asiatic Society, Kolkata; University of Hyderabad, Telangana; Jadavpur University, Kolkata; Kolkata University; Defence Metallurgical Research Laboratory, Hyderabad; Botanical Survey of India, Govt. of India, Kolkata and Archaeology & Museumology Calcutta University, Kolkata.

### **Indian Metallic Heritage: Perspectives and Issues on Characterization and Conservation of Ancient Metallic Objects**

A discussion meeting on Indian Metallic Heritage : Perspectives and Issues on Characterization and Conservation of Ancient Metallic Objects was jointly organized by the Indian National Academy of Engineering; ASI, Department of Culture; The Indian Institute of Metals; ASM International, USA & ASM International India Chapter, at India International Centre, New Delhi, on December 3, 2014. The objective of the meeting was to celebrate the Historical Landmark Recognition Award given to Delhi Iron Pillar by ASM International, USA. Every year ASM, International recognizes metallurgical heritage around the world, and during the 100<sup>th</sup> year of ASM International special recognition has been given to Delhi Iron Pillar as world's Historical Landmark.





*Dr. Baldev Raj, President, INAE & Director, NIAS chairing an open session on “Future Pathways : Strategies and Collaborations” during the Discussion Meet*

A panel discussion moderated by Prof. S. Ranganathan, NIAS, Bangalore on “Characterization, Conservation and Digital Exhibition of Ancient Metallic Objects”, and an open session chaired by Dr. Baldev Raj, President, INAE and Director, NIAS on “Future Pathways : Strategies and Collaborations” were some of the highlights of the event. During this event Prof. Ravi Ravindran, Past President of ASM International, USA handed over the Award Plaque to Dr. Baldev Raj, President, INAE and Shri T.R. Sharma, Regional Director (North), representative of ASI, Department of Culture. Eminent professors, researchers and archaeo metallurgists from IITs; IISc., Bangalore; IGCAR, Kalpakkam; NIAS, Bangalore; Deccan Engineering College & College of Engineering, Pune; NML, Jamshedpur; ASM, India Chapter and other industry representatives participated in the meeting.



*Dr. Baldev Raj, President, INAE and Dr. Ravi Ravindran, Past-President of ASM International handing over the Plaque to Mr. TR Sharma from Archaeological Survey of India (ASI)*



The event was coordinated by Dr. U. Kamachi Mudali, Co-Chairman, INAE Study Group on Indian Engineering Heritage on Metallurgy. After intense discussions, the meeting concluded with the following recommendations to be pursued by IIM, INAE, ASM India, in collaboration with ASI, Department of Culture: (i) Publications and programmes on metallurgical heritage for inspiring young students, (ii) Metallurgy heritage camp to have hands on practice and knowledge on materials, (iii) Marvels of Indian Metallurgical Heritage - a Coffee Table book, (iv) Digital museum with metallurgical heritage objects, (v) Characterisation of ancient metallic objects with advanced techniques with support of government and private R&D organisations, (vi) Popularising metallurgical heritage through press, events and lectures attracting public, parliamentarians, and everyone.





## 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 Committee (PMC) for these Research Studies have been constituted to review the progress of the study.

### INAE Research Studies

#### 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 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 Advisory, KPMG India Pvt Ltd., Mumbai as Chairman, Dr. BD Kulkarni and Mr. DP



Misra as Members and Dr. KV Raghavan as Member-Secretary. The 1st PMC Meeting of the research study was held on Sep 2, 2014 at Indian Institute of Chemical Technology, Hyderabad. Shri Utkarsh Palnitkar, the Chairman of the PMC, expressed his appreciation for selecting the technology trend analysis as the focal theme of the INAE project. The technology forecasting is very difficult task considering the exponential growth in open and patent literature in diverse areas of chemical and allied disciplines. The technology trends in four countries viz., USA, India, Japan and China which are being analysed in the proposed project to assess the Indian situation in relative sense are vital for the growth of the chemical industry. Dr K V Raghavan, PEI informed that the PMC will provide the direction to the project team apart from assessing the overall progress made by the project vis a vis the targets fixed in the original project proposal. Presentations were made on the following aspects: Past INAE project sample studies; Scope of present study; Methodology proposed for scientometric analysis; Patent search classification codes to be employed; Time schedules for project activities and project budget; Anticipated project outcomes and Proposal for undertaking a pilot study on heterocyclic compounds its scope and execution strategy.

Dr KV Raghavan during his briefing stated that the project of this nature requires multidisciplinary inputs of high order both from internal and external agencies and the subject experts identified by the project team have to provide lead inputs in technology trend analysis. They have to make their own independent assessment of current and future technology trends. Successful completion of this task will provide a strong technology assessment tool for INAE and IICT to jointly work for evolving National Technology Alert system for the chemical sector on a long term basis. The PMC expressed its satisfaction with the progress made so far in the project and the establishment of appropriate software and scientometric data processing system at IICT. They also felt that it is appropriate that a pilot study is being undertaken by the project team with focus on technology trends in heterocyclic compound synthesis and its downstreaming. The pilot study has to establish all the important features of technology trend analysis to make it representative to the final outcome of the project. The study which commenced on April 1, 2014 is expected to be completed by March 31, 2016.

## **Non-Ionizing Electromagnetic Radiation effects on Biological Systems and Protection Methods**

The INAE Governing Council during its meeting held on Dec 12, 2013 at Bhubaneswar had approved the research study proposal on “Study of Non-Ionizing Electromagnetic Radiation effects on Biological Systems and Protection Methods” for a duration of 8 months with Shri VP Sandlas, FNAE as the Principal Engineering Investigator (PEI) . The objective of the research study is to comprehensively review and define current status, internationally accepted guidelines on generation and control of electromagnetic radiations, position of related regulations in India and recommend safety levels. A Project Monitoring Committee (PMC) to monitor the research study was constituted with Dr. BN Suresh, as Chairman; and Prof. RK Mallik and Dr. Surendra Pal as Members and Shri VP Sandlas as Member-Secretary.

Electromagnetic Radiation emissions, related environmental pollutions and harmful effects on biological systems, particularly on human beings, have started engaging significant attention of the World Health Organization (WHO), medical professionals and general public during the last several years, particularly because of wide spread usage of mobile phones and related radio frequency radiation effects. Hazards of Electromagnetic Radiation (EMR) emissions and related harmful effects on biological systems, particularly on human beings, have started engaging significant attention of general public during the last few years.



These emissions are synonymous with Electromagnetic Pollution, a kind of Environmental Pollution, polluting the very limited natural resource: Radio Spectrum. Till recently, continuous exposure to Electromagnetic waves (or radio waves) was localized to areas near broadcasting stations, radars, radio communication terminals, etc. – the related radiations were not adversely affecting inhabited areas and general public in residential areas, hospitals, schools, etc. The situation has changed significantly during the last few years with the proliferation of cell phones, related base station towers and other EMR sources.

Scientific studies have demonstrated short term and medium term effects of EMR on animals and human beings; children, weak or sick persons, pregnant women and small animals are particularly vulnerable. Of course, debates are going on as to whether these effects are temporary or permanent. There is a strong feeling that even ‘global warming’ may be related to excessive radiation levels. The Indian Council of Medical Research and the World Health Organization have recommended precautionary approach in relation to the use and control of radiations and have also suggested adoption of internationally recommended acceptance standards and rules and regulations to ensure safety of general public. Some recent studies and arguments emphasize that there is no such thing as safe electromagnetic radiation level. Generally accepted safe levels vary from  $1 \mu\text{W}/\text{m}^2$  for sleeping areas and  $10 \mu\text{W}/\text{m}^2$  for other living and working areas to as much as  $1000 \mu\text{W}/\text{m}^2$ ; recommending that significantly less and minimum possible level should be used for practical applications. The scope of the study is to review and bring out a report on the current status, internationally accepted and approved restrictions on generation of EM radiations, position of recent Govt. of India decisions, recommended safety levels and protection methods.

The research study has since been completed and the study report has been posted on INAE website. The report covers topics on International EMF Exposure Standards; initiation of public awareness and debate in India; PIL- Legal battle with Govt. of India; electromagnetic radiation for AC Power lines; biological effects of EMR; EMR from base Station towers and Mobile phones; recommended guidelines, precautions and protection methods and future prospects and concluding remarks. The study report is envisaged to shall serve a comprehensive reference document, particularly for non-ionizing radiation exposure.

## **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 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, will be determined and training efforts in this regard will be woven in.





## Materials for Modern Infrastructure

INAE has undertaken a research study on “Database for Construction Materials for Infrastructure Sector” with Prof. SK Bhattacharyya, Director, Central Building Research Institute (CBRI), Roorkee as the Principal Investigator with Dr. Subrata Chowdhury, Joint President, Ultra Tech Cement Ltd. as Member and Dr. B Singh, Chief Scientist, CSIR-CBRI and Prof. Biswajit Bhattacharjee, IIT Delhi as Consultants.

The Project Monitoring Committee (PMC) has since been constituted with Prof. Prem Krishna, Formerly Professor & Head of Civil Engg. Department, IIT Roorkee; Dr. Nagesh R Iyer, Formerly Director, CSIR-SERC, Chennai and Prof. DV Singh as Former Director of IIT Roorkee and Former Vice-Chancellor, University of Roorkee as members and Prof. SK Bhattacharyya, PEI as Member-Secretary of the Committee.

The objective of the study is to highlight the availability of different types of materials, its efficacies and deficiencies and to generate newer materials with a focus on energy efficiency and sustainability. The research study would focus on creating database of the available construction materials that are in use, identify systematically the deficiencies that exist within these materials and the ways to overcome those deficiencies and the requisite research needs.

## 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” has been commissioned by INAE under the auspices of Principal Scientific Advisor (PSA) to Govt. of India. Captain NS. Mohan Ram, VSM, Indian Navy (Retd), FNAE & Consultant, TVS Motor Company Limited is the Principal Investigator and Dr. Basudam Adhikari, IIT Kharagpur; Mr. S.Sugumar, Central Institute of Plastics Engineering and Technology (CIPET), Chennai and Dr. LM Gantayet, Bhabha Atomic Research Centre, Mumbai are the Members.

The Research Study focuses on developing systems for recycling rubber and plastics. More importantly, it is required to carry out research and development on recovery of useful materials from auto shredded residue and minimize the extent of residues going into refills.

The Study will be conducted in three phases in which phase 1 will focus 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. This task will be carried out by analysis of past production data and postulating lives of different classes of vehicles. Phase 2 will focus on development of laboratory scale processes for material recovery from dismantling nonmetallic elements like rubber, plastics, ceramics etc. and proposals for deploying the methods to industrial scale. Phase 3 will be concerned with identification of processes for recovery of useful materials and energy from ASR and minimizing the final residues which require landfills.

A workshop on “Automotive Recycling Research” was organized on March 12, 2015 at India International Centre, New Delhi to receive inputs from the stakeholders and experts for finalization of the report on the Research Study. The workshop was presided over by Dr. R Chidambaram, Principal Scientific Adviser to the Government of India and Dr. BN Suresh, President, INAE. The workshop was attended by the stakeholders and experts from industry, R&D and concerned Ministries/Government Departments. Various recommendations have emerged during the brainstorming session and the same are being compiled for incorporation in the final report.



## Research Schemes

With the objective to encourage invention, investigation, research and promote high caliber of engineering-scientists, INAE has instituted four schemes, viz., INAE Chair Professorship; INAE Distinguished Professors/Technologists; Mentoring of Engineering Teachers by INAE Fellows and Mentoring of Engineering Students by INAE Fellows.

### INAE Chair Professorship

The following nominees were selected as INAE Chair Professors during this year.

- Prof. Nikhil R Pal, Electronics and Communication Sciences Unit, Indian Statistical Institute, Kolkata.
- Prof. NK Mukhopadhyay, Professor in Physical Metallurgy, Department of Metallurgical Engineering, Institute of Technology, (Banaras Hindu University), Varanasi.
- Prof. Sirshendu De, Department of Chemical Engineering, Indian Institute of Technology, Kharagpur.

### INAE Distinguished Professors/Technologists

The following nominees were selected as INAE Distinguished Professors/Technologists during this year.

- Prof. BB Chaudhuri, JC Bose Fellow and Head, Computer Vision & Pattern Recognition Unit, Indian Statistical Institute, Kolkata subject to his superannuation and confirmation of not being appointed to any other Chair.

### Mentoring of Engineering Teachers by INAE Fellows

A total of fourteen 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 Mentor           | Name of Engineering Teacher | Institution of Teacher                             |
|------|--------------------------|-----------------------------|--|
| 1    | Dr J Krishnan            | Dr Vishvesh J Badheka       | Pandit Deendayal Petroleum University, Gandhinagar |
| 2    | Prof Suman Chakraborty   | Dr Dharmendra Tripathi      | National Institute of Technology, Delhi            |
| 3    | Prof Sivaji Chabravorti  | Mr Aritra Ghosh             | Murshidabad College of Engineering & Technology    |
| 4    | Prof K Bhanu Sankara Rao | Dr R Arockia Kumar          | NIT Warangal                                       |
| 5    | Dr AA Gokhale            | Dr KS Suresh                | University of Hyderabad                            |
| 6    | Prof S Mohan             | Dr N Ramsundram             | Kumaraguru College of Technology, Coimbatore       |
| 7    | Prof Sukumar Mishra      | Ms Kusumlata Agarwal        | Jodhpur Institute of Engg. & Technology, Jodhpur   |
| 8    | Prof Indradev Samajdar   | Dr Rajesh Khatirkar         | VNIT Nagpur  |
| 9    | Dr G Madhusudhan Reddy   | Mr VSM Ramakrishna R        | Mahatma Gandhi Institute of Technology, Hyderabad  |



|    |                     |                             |   |
|----|---------------------|-----------------------------|---|
| 10 | Prof Debatosh Guha  | Ms Debarati Ganguly         | Lourdes Matha College of science and Technology, Trivandrum |
| 11 | Dr BM Reddy         | Mr R Guruswamy              | BVRIT College of Engineering for Women, Hyderabad           |
| 12 | Prof AK Pradhan     | Mr Saumendra Sarangi        | National Institute of Technology, Uttarakhand               |
| 13 | Prof Ganapati Panda | Dr Satyasai Jagannath Nanda | Malaviya National institute of Technology, Jaipur           |
| 14 | Prof SK Koul        | Mr Brijesh Ramchandra Iyer  | Dr BA Technological University, Raigad                      |

### Mentoring of Engineering Students by INAE Fellows

A total of thirty 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 Mentor            | Name of Engineering Student      | Institution of Student   |
|------|---------------------------|----------------------------------|--|
| 1    | Dr S Srikanth             | Mr Konda Akash Deep              | National Institute of Technology Jamshedpur                    |
| 2    | Prof Ganapati Panda       | Mr Anshuman Susantakumar Patnaik | National Institute of Technology, Rourkela                     |
| 3    | Prof Sushmita Mitra       | Mr Gourab Chowdhury              | International Institute of Information Technology, Bhubaneswar |
| 4    | Prof Rajaram Nagappa      | Mr Sivabalamanigandan S          | Madras Institute of Technology, Chennai                        |
| 5    | Prof MR Madhav            | Mr Wattamwar Mayur Kishan Rao    | IIT Varanasi   |
| 6    | Prof Suman Chakraborty    | Mr Chandrachur Bhattacharya      | Jadavpur university, Kolkata                                   |
| 7    | Mr Sriram Jayasimha       | Ms Ananya Kumari                 | Tezpur University, Tezpur                                      |
| 8    | Prof Sivaji Chakravorti   | Mr Amit Kumar                    | National Institute of Technology Meghalaya                     |
| 9    | Prof Pradip Dutta         | Mr Sujay Raj                     | Indian School of Mines, Dhanbad                                |
| 10   | Prof BS Murty             | Ms Geeta Kumari                  | National institute of Technology Jamshedpur                    |
| 11   | Prof. Subrata Chakraborty | Mr Rudroneel Manna               | KIIT University, Odisha  |
| 12   | Dr Shrikant V Joshi       | Mr Mahendar Peddi                | RGUKT, Hyderabad   |
| 13   | Dr G Sundararajan         | Mr Munibhaskar Siva Kumar        | RGUKT, Hyderabad   |



|    |                          |                              |  |
|----|--------------------------|------------------------------|--|
| 14 | Mr N Saibaba             | Mr Sunkara Venkata Tejaswi   | NIT Warangal   |
| 15 | Prof S Mohan             | Mr Abhinandh R               | Kumaraguru College of Technology, Coimbatore                     |
| 16 | Prof K Sudhakar          | Mr Sagar Rohira              | IIT Bombay   |
| 17 | Prof Sukumar Mishra      | Mr Manish Mukherjee          | Jadavpur University Kolkata                                      |
| 18 | Prof Sankar K Pal        | Ms Priyanka Kumari           | NIT Jamshedpur   |
| 19 | Dr G Madhusudan Reddy    | Mr K Shekar Reddy            | Mahatma Gandhi Institute of Technology, Hyderabad                |
| 20 | Prof B Yegnanarayana     | Mr Chukka Rajesh             | RGUKT, Nuzvid  |
| 21 | Ms Alpa Sheth            | Mr Priyanshu Dewan           | IIT Varanasi   |
| 22 | Prof Shibani K Koul      | Ms Chamakura Sarika          | University College of Engineering, Osmania University, Hyderabad |
| 23 | Prof Samit K Ray         | Mr Krithik Soman             | Jaypee Institute of Information Technology, Noida                |
| 24 | Dr Soumitra Tarafder     | Ms Mahashweta Ray            | National Institute of Technology Durgapur                        |
| 25 | Prof B Sundar Rajan      | Ms Radha JK                  | SM Visvesvaraya Institute of Technology Bangalore                |
| 26 | Shri M Narayana Rao      | Mr M Vachaspathi             | Mahatma Gandhi Institute of technology, Hyderabad                |
| 27 | Dr Mukesh Sharma         | Ms Neha Gupta                | Thapar university Patiala  |
| 28 | Dr SV Kamat              | Mr Behera Santosh Kumar      | RGUKT , Nuzvid   |
| 29 | Dr AA Gokhale            | Ms B Padmavathi              | RGUKT, Nuzvid  |
| 30 | Prof K Bhanu Sankara Rao | Ms Nalajala Divya            | RGUKT, Nuzvid  |
| 31 | Prof Pallab Dasgupta     | Ms Apurva Bhushan            | KIIT University, Odisha  |
| 32 | Prof SK Kaushik          | Mr Saksham Bhutani           | IIT Varanasi   |
| 33 | Prof PK Dash             | Mr G Kishan Prudhvi          | SRM university Chennai   |
| 34 | Dr U Kamachi Mudali      | Mr G Thendral                | PSG College of Engineering, Coimbatore                           |
| 35 | Prof MA Ramaswamy        | Mr Ankur Kaushik             | Indian Institute of Technology Bombay                            |
| 36 | Dr Ashish Lele           | Mr Amit Dhundi               | LIT Nagpur   |
| 37 | Prof K Ramesh            | Mr Badrinath Balasubramaniam | BITS Pilani, Goa Campus  |
| 38 | Prof KT Jacob            | Ms Arneet Rajput             | Maulana Azad National Institute of Technology, Bhopal            |



## INAE Forums

One of the important objectives of the Academy is to assist the Government from time to time in formulating policies on critical technical issues. For this purpose, four INAE forums have been constituted –Forum on Engineering Education, Forum on Energy, Forum on Technology Foresight and Management, and Forum on Engineering Interventions for Disaster Mitigation. These forums enable giving inputs to policy makers, institutes of higher learning and research, industries, etc, and also provide a platform for collaborations with Academies of Sciences in India and Academies of Engineering abroad in the framework of the International Council of Academies of Engineering and Technological Sciences (CAETS).

### Forum on Energy

The INAE Forum on Energy comprises Dr Baldev Raj as Chairman and Dr KV Raghavan, Dr RR Sonde, Prof SS Murthy, Dr Ajay Mathur and Dr Purnendu Ghosh as Members. This Forum has the mandate to address all issues related to energy. Dr Baldev Raj is the Chair of CAETS Energy Committee comprising 11 Member Academies of CAETS. This Committee is engaged in bringing out a Report on “Transitioning to LCE: Technological and Engineering Challenges in Building and Transport Sectors.”. Dr KV Raghavan, Vice -President, INAE and Member, Drafting Committee is coordinating the compilation of the report. A meeting of the CAETS Energy Committee hosted by acatech, Germany was held on Nov 19-21, 2014 at Berlin, Germany which was attended by Dr Baldev Raj and Dr KV Raghavan. The next meeting of the CAETS Energy Committee is being hosted by Royal Academy of Engineering, UK on May 28-29, 2015 at London.

### Forum on Engineering Education

Dr Baldev Raj, President, INAE vide a letter dated Oct 20, 2014 to MHRD had intimated that that INAE would be forwarding inputs and recommendations for consideration towards the formulation of the National Education Policy by MHRD. The INAE Forum on Engineering Education, which has the mandate of addressing issues related to advancement of engineering education in the country, had since deliberated on the subject and has identified pertinent issues and challenges being faced in the area of engineering education. A brief note on the pertinent issues of concern and challenges regarding improving the quality of engineering education in the country were forwarded to Honourable Minister for Human Resource Development Smt Smriti Zubin Irani during Feb 2015 for consideration.

Salient points covered in the report are given below.

Higher education plays a primary role in the development of a society. Likewise Technical education provides the base for the economic growth of a country and the quality of life of its people. The note attempts to highlight the major issues requiring consideration while formulating the new policy for higher education, besides offering ideas for addressing the concerns brought out. Inputs on the following vital issues were given for an effective reform in engineering education of the country: Forecast of the expansion of the technical education system; maintaining quality of engineering education; review of admission process; re-designing of curricula keeping in view changing needs; revamping examination system; Faculty Shortage vis-a-vis Distant Education; importance of Academia-Industry Interaction; skill development; international collaboration; Incubation / Entrepreneurship and general recommendations. The INAE Forum on Engineering Education would be deliberating further on each of these problems to arrive at suggested viable solutions which would be forwarded to MHRD at a later date.





## Forum on Technology Foresight and Management

Indian National Academy of Engineering (INAE) constituted a “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, besides other INAE Fellows and experts.

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.

It is a well-known fact that “Technology Foresight” is regarded as the most upstream element of the technology development process. It provides inputs to the formulation of technology policies and strategies that guide the development of the technological infrastructure. In addition, technology foresight provides support to innovation, leading to enhanced competitiveness and inclusive growth. Technology foresight helps the engineers, scientists, industrialists, government officials and other strategists in the society; to identify the areas of strategic research and the emerging technologies likely to yield the greatest economic and social benefits.

The Forum has brought out three challenges/areas in the first Report being compiled 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 suggestions/recommendations of the Forum highlighted in the report are considered to be of value to the Nation and all policy-makers, engineers, technocrats and administrators in addressing the national challenges. 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 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 have also been covered.

## Forum on Engineering Interventions in Disaster Mitigation

The Forum on Engineering Interventions for Disaster Mitigation has been constituted recently with Dr RK Bhandari as Chairman and Prof Prem Krishna, Prof DV Singh, Prof SS Chakraborty, Mr VK Agarwal, Prof CVR Murty, Prof DK Paul and Ms Alpa Sheth as members. This Forum will 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.

A mud avalanche took place at Malin near Pune in Maharashtra on July 30, 2014 in early hours of morning, which resulted in the death of more than 60 people. In order to learn from this mud avalanche tragedy towards prevention of similar disasters in future, Dr. RK Bhandari, Chairman of INAE Forum on Engineering Interventions for Disaster Mitigation proposed a three members team to study make a field study. The three member INAE team comprising of two INAE Young Associates Dr Deepankar Choudhury and Dr Dipti Ranjan Sahoo and Dr G Ganapathy, subject expert visited the site of the Malin



mudslide during August 16-20, 2014 to carry out technical investigation and prepare a report on the cause of the mudslide and steps to prevent future disasters. The first draft of the Malin Gaon Landslide Report, prepared based on field mapping investigations and a critical analysis of the field observations carried out during August 2014 was circulated in advance of the third meeting of the INAE Forum held on 22 September 2014. A formal presentation of the draft report was made by Dr CD Thatte who coordinated the study from Pune and the Chairman. The Forum discussed the site specific maps, geology, topography, debris flow geometry, mapped outcrops, implication of farm terraces, and the longitudinal and the cross-sectional profiles before and after the slope failure. The points of deficiency identified in the draft report included poor quality of shear strength data, no information about pore pressures generated due to sub slope and overland water flow within the slope mass, and possible long term effect of paddy cultivation at the lower levels and an unclear picture of the mechanism of failure. An article on the study was published in Current Science in August 2014 for the benefit of other investigators. It is planned that the report will be finalized for consideration of the Forum by the third week of June 2015.

Threats of Landslide in India are real and widespread. The resulting landslide disasters are getting more frequent and devastating, especially because of poorly regulated urbanization, climate change and violence against Nature. The Forum on Engineering Interventions for Disaster Mitigation in consultation with major stakeholders and jointly with several leading knowledge institutions, proposes to address 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 proposes to hold two roundtable meetings. The first Roundtable on Landslide Disasters in India -Some Vexing Issues Related to Landslide Control is being organized by the INAE Forum on Engineering Interventions for Disaster Mitigation on Technology Day: 11 May 2015 at Central Road Research Institute, New Delhi. Dr RK Bhandari is the Convenor of the roundtable.



## Engineering Excellence Awards

### Life Time Contribution Award in Engineering, 2014

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. S Ranganathan, NASI Senior Scientist Platinum Jubilee Fellow, Indian Institute of Science, Bangalore and Mr. S Ramadorai, Vice-Chairman, Tata Consultancy Services, Mumbai were conferred Life Time Contribution Awards in Engineering 2014. Prof S Ranganathan was conferred the award in recognition of his outstanding contributions in the fields of metallurgy, quasi crystals, bulk metallic glasses and nano-structured metals. Mr. S Ramadorai was awarded in recognition of his outstanding contributions for his leadership role in information technology industry.

### Prof. Jai Krishna and Prof. SN Mitra Memorial Award, 2014

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. Avinash Chander, Scientific Advisor to Raksha Mantri, Secretary, Defence Research & Development and Director General, Defence Research & Development Organization (DRDO), Ministry of Defence, New Delhi was conferred the Prof. Jai Krishna Memorial Award 2014 in recognition of his outstanding and pioneering research contributions in the area of Navigation and Guidance Systems and Critical Defence Technologies. Prof. RK Shyamasundar, Senior Professor and JC Bose National Fellow, Tata Institute of Fundamental Research, Mumbai was conferred the Prof. SN Mitra Memorial Award 2014 in recognition of his significant contributions in the areas of Formal Modelling and Methods for Complex Software Systems.



### **INAE Outstanding Teachers Award, 2014**

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 - in 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).

Group-2 - in 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).

Prof. Pradip Dutta, Department of Mechanical Engineering, Indian Institute of Science, Bangalore and Prof. Bhargab B Bhattacharyya, Advanced Computing and Microelectronics Unit, Indian Statistical Institute, Kolkata were conferred the INAE Outstanding Teachers Award 2014. Prof Pradip Dutta was awarded in recognition of his outstanding contributions to Energy Systems and Advanced Thermal Technologies whereas Prof Bhargab B Bhattacharyya was conferred the award in recognition of his significant contributions to computer science and engineering and microfluidics.

### **INAE Young Engineer Awards, 2014**

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, 188 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 2014 were sought from INAE Fellowship, Engineering institutions, R&D Labs. Out of 90 nominations, 30 were shortlisted by the Sectional Committees. The shortlisted candidates gave presentation of their work before the Selection Committee on Sep 25, 2014 at New Delhi.

The following ten candidates were selected for conferment of Young Engineer Award 2014.

- 1 Dr. Shaikh Faruque Ali, Assistant Professor, Department of Applied Mechanics, Indian Institute of Technology Madras, Chennai.
- 2 Dr. Anirban Mukhopadhyay, Associate Professor and Head, Department of Computer Science and Engineering, University of Kalyani, Kalyani.
- 3 Dr. Rajneesh Bhardwaj, Assistant Professor, Department of Mechanical Engineering, Indian Institute of Technology Bombay, Mumbai.
- 4 Dr. Abhijit Chatterjee, Assistant Professor, Department of Chemical Engineering, Indian Institute of Technology Bombay, Mumbai.
- 5 Dr. A Seshagiri Rao, Department of Chemical Engineering, National Institute of Technology Warangal, Hanamkonda-Kazipet Highway, Warangal.





- 6 Mr. Rohit Shukla, Scientific Officer ‘E’”, E&ED, Bhabha Atomic Research Centre Facility, Visakhapatnam.
- 7 Dr. Sabha Raj Arya, Assistant Professor, Electrical Engineering Department, SV National Institute of Technology, Surat.
- 8 Dr. Kushal K Shah, Assistant Professor, Department of Electrical Engineering, Indian Institute of Technology, New Delhi.
- 9 Mr. Sarma Gunturi, Principal Engineer-System, Texas Instruments India, Bangalore.
- 10 Dr. Anoop Kumar Shukla, Scientist/Engineer SE, SMF/MMG/MME, Vikram Sarabhai Space Centre, Trivandrum.

### **Innovative Student Projects Awards, 2014**

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 five at Bachelor level were selected by the Selection Committee for conferment of Innovative Student Projects Awards, 2014 as given below.

#### **Doctoral Level**

- 1 Dr Kranthi Kumar Maniam, Indian Institute of Technology Madras(*Development of Shape Controlled Palladium Structures as Electrocatalysts for Fuel Cell Applications*)
- 2 Dr G Sivakumar, Indian Institute of Technology, Bombay.(*Understanding Solution Precursor Plasma Spray Process to Deposit High Performance Ceramic Coatings*)
- 3 Dr. Sandip Chakraborty, Indian Institute of Technology, Guwahati.(*Capacity Enhancement, QoS and Rate Adaptation in IEEE 802. 11S: A Performance Improvement Perspective*)
- 4 Dr Jeevanjyoti Chakraborty, Indian Institute of Technology Kharagpur.(*Electrokinetics in Narrow Fluidic Confinements: The Role of Streaming Potential*)
- 5 Dr. Himanshu Sharad Bhatt, Indraprastha Institute of Information Technology, Delhi.(*Emerging Covariates of Face Recognition*)

#### **Master’s Level**

- 1 Mr P Pravin Kumar Venkat Rao, Visvesvaraya National Institute of Technology Nagpur.(*Effect of Seismic Zone & Storey Height on response Reduction Factor for Steel Moment Resisting frame*)
- 2 Mr Parthsarathi Pachori, Indian Institute of Technology Kharagpur.(*Energy Integration in Refinery Distillation Columns -A Simulation Study*)



- 3 Mr. Krishan Kant, Indian Institute of Technology Delhi. (*Design, Control and Implementation of Brushless Generators Based Standalone Microgrid*)
- 4 Mr. Debranjana Mukherjee, Indian Institute of Technology, Kharagpur. (*Voltage Sensor-less Space Vector Control of Vienna Rectifier with Programmable Input Power Factor*)
- 5 Mr S Balamurugan, National Engineering College, Kovilpatti. (*Leaf Based Cotton Plant Identification Using OMAP*)

### **Bachelor Level**

- 1 Anirban Paul, Nitish Kumar and Shikha Maharana Indian Institute of Space Science and Technology (IIST) (*Polymer MEMS with novel transduction techniques*)
- 2 Harish Rammohan S, St Joseph's College of Engineering, Chennai. (*Design of Gyroscopically Controlled biomorphic robot and gait generation for assisted walking of humans*)
- 3 Ashish Tatolu and Surabissree M DISri Venkateswara College of Engineering, Tamilnadu. (*In vitro Studies on the Binding of Mangiferin to IL4 Receptor of B lymphocytes*)
- 4 Akash Vinit Mehta, Urvis Kishore Patel, Rajeev Mohan Panthai and Viral Ramesh Jain, St John College of Engineering and Technology, Maharashtra. (*Alternative to Natural Sand*)
- 5 Shivam Chourey, Indian Institute of Technology, Patna (*Development and Control of Magnetically Controlled Micro-robots*)



## Joint Schemes with AICTE

### AICTE-INAE Distinguished Visiting Professorship Scheme

It has long been felt that there is a need for active linkages between industry and engineering institutions which not only enrich the curriculum content but also add another dimension to the existing systems of continuing education programmes, extension lectures and consultancy by faculty. 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 selection committee of experts from Academia, Industry and representatives from AICTE and CII.

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 TATA Steel, Hewlett Packard, Hinduja Automotive Limited, M/s IP Rings, Tata Research Development & Design Centre, Aditya Birla Group (Cement Division), UltraTech Cement Ltd., Visual Collaboration Technologies Pvt Ltd, Applied Cognition Systems Ltd and Mishra Dhatu Nigam 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. *“The scheme is a rare opportunity provided to the student community and is inspiring the research scholars to develop innovative building materials”.* Faculty Coordinator, Mepco Schlenk Engineering College, Virudhunagar District, Tamil Nadu.
- b. *“The students were very excited knowing the research frontiers in the area of study”.* Faculty Coordinator, Cochin University of Science and Technology, Kochi.



- c. *“The scheme is helpful to the intuitions at large in curriculum development with the changing scenario of industrial needs. In addition, it also creates a liaison between institutions and industry and students are helped in their project work. The lecture delivered by the industry expert also apprises the students about the practical applications and the gap between theory and practice”.* Faculty Coordinator, Dhanalakshmi Srinivasan Engineering College, Perambalur
- d. *“The scheme has given an opportunity for the faculty and students to interact with a leading industry practitioner and the students, research scholars and faculty are benefitted by his guidance in the research activities”.* Faculty coordinator, M.S. Ramaiah Institute of Technology, Bangalore.
- e. *“The lectures were on recent advances in the subject that identified many research opportunities”.* Faculty Coordinator, Mahatma Gandhi Institute of Technology Hyderabad

The Steering Committee during its meeting on May 23, 2014 discussed 22 nominations received, and selected the following 12 industry experts.

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, Kanchanbagh, Hyderabad*
5. Dr P Sriram,  
*Chairman, Rapsri Engineering Products Company Ltd, Harohalli, Bangalore*
6. Dr BC Pai,  
*CSIR emeritus Scientist, CSIR, National Institute for Interdisciplinary science and technology (NIIST), Industrial Estate, Papanancode, Tiruvanthapuram*
7. Dr Chaitanyamoy Ganguly,  
*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, Bangalore*
10. Dr Manish Roy,  
*Scientist ‘F’, Defence Metallurgical Research Laboratory, Kanchanbagh, Hyderabad*
11. Dr MD Mathew,  
*Scientific Officer H+ (Joint Secretary Rank), Head, Mechanical Metallurgy Division, Indira Gandhi Centre for atomic research, Department of Atomic Research, Kalpakkam, Tamil Nadu*
12. Prof Mahesh C Tandon,  
*Managing Director, Tandon Consultants Pvt Ltd, New Delhi*





## 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      | Arnab Kundu           | Birbhum Institute of Engineering and Technology, Birbhum                  | Mobile Communication & Network Technology           | CSIR-CMERI Durgapur  |
| 2      | Debasri Chakraborty   | Birbhum Institute of Engineering and Technology, Birbhum                  | Geographic Information System                       | CSIR-CMERI Durgapur  |
| 3      | Mukund Arun Patil     | GH Raisonni Institute of Engineering and Management, Jalgaon, Maharashtra | Mechanical Engineering                              | CSIR-CMERI Durgapur  |
| 4      | BS Somesh             | Reva Institute of Technology and Management, Bangalore                    | Simulation and Modeling in Signal Processing Domain | CSIR-CMERI Durgapur  |
| 5      | M Shireesha           | Anurag Group of Institution, Ranga Reddy Distt., (AP)                     | Chemical Engineering                                | CSIR-IICT Hyderabad  |
| 6      | Jangiti Siva Prasanth | Anurag Group of Institution, Ranga Reddy Distt., (AP)                     | Information Security                                | CSIR-IICT, Hyderabad |
| 7      | Amit Naik             | Shri GS Institute of Technology & Science                                 | Electronics and Communication                       | DRDO-DIAT, Pune      |



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

| S. No | Name              | Engineering College/Institution   | Title of the Paper  | Name of the Event, Date & Venue   |
|-------|-------------------|-----------------------------------|---|---|
| 1     | Shreyas BS        | MSRIT, Bangalore                  | An Intelligent System to Detect, Avoid and Maintain Potholes : A Graph Theoretic Approach                               | 7 <sup>th</sup> International Conference on Mobile Computing and Ubiquitous Networking on Jan 6 – 8 2014 at Singapore     |
| 2     | Raffi Mohammed    | Andhra University, Vishakhapatnam | Effect of Welding Processes on Microstructure and Corrosion Behaviour of Aluminium Alloy AA 2219-T87 Welds              | 1 <sup>st</sup> International Conference on Welding and Non-Destructive Testing on Feb 25-26, 2014 at Karaj, Iran         |
| 3     | Nishanth K Prasad | 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  |
| 4     | Amir Ahmed        | 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 |



|    |                        |   |  |   |
|----|------------------------|---|--|---|
| 5  | Bhavana KH             | NMIT, Bangalore                                   | Power Generation Unit of Nano-Satellites SUDSAT 2A/2B  | 10 <sup>th</sup> European Space Power Conf. on Apr 13-17, 2014 at Noordwijkerhout, The Netherlands                                    |
| 6  | Abhiram Aithal         | MSRIT, Bangalore                                  | Study of Utilization of wind induced Vibrations in Generation of Electricity                             | 6 <sup>th</sup> Annual IEEE Green Technologies Conference on Apr 3-4, 2014 at Corpus Christi, Texas, USA                              |
| 7  | Amrita Roy Chowdhury   | BESU, Shibpur                                     | LOCHA : A Light-Weight One-way Cryptographic Hash Algorithm for wireless Sensor Network                  | 5 <sup>th</sup> International Conference on Ambient Systems, Network and Technologies (ANT-2014) on Jun 2-5, 2014 at Hasselt, Belgium |
| 8  | Manikandan P           | 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   |
| 9  | JP Mishra              | College of Engg. Pune                             | Levant Differentiator Based Output-Feedback Control for SLOSH Suppression using super-Twisting Algorithm | 26 <sup>th</sup> Chinese Control and Decision Conference on May 31- Jun 2, 2014 at Changsha, China                                    |
| 10 | Abhilash M             | 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                                    |
| 11 | B. K Murugan           | 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   |
| 12 | R. Rishikesh           | 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               |
| 13 | Syam Sujith Maddikonda | Amrita University, Coimbatore                     | SAR Image Processing using GPU   | The 40th COSPAR Scientific Assembly on Aug 2-10, 2014 at Moscow, Russia   |



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| 14 | Sourabh Rakhya          | 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.   |
| 15 | Sanket Kailas Gorade    | 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   |
| 16 | Ms. Meenakshi S         | 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   |
| 17 | Binu KR                 | Manipal Institute of Technology, Manipal                        | Baseline studies of major ions and heavy metals in a large tropical river, South-Western India         | 11th International Symposium on Recent Advances in Environmental Health Research and the 13th International Symposium on Metal-ions in Biology and Medicine on Sep 14-18, 2014 at Pascagoula Street, USA |
| 18 | Debashree De            | Jadavpur University, Kolkata                                    | Implementation and value creation of Green Productivity by Green Supply Chain Management               | 2 <sup>nd</sup> International Conference on Advances in Civil, Structural and Mechanical Engineering - CSM 2014, on Nov 16-17, 2014 at University of Birmingham, UK                                      |
| 19 | Syed GhaziSarwat        | 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   |
| 20 | Pranjal K Naik          | College of Engineering Pune                                     | Design and Optimization of the structure of a IU Picosatellite   | 28 <sup>th</sup> Space Simulation Conference on Nov 3-6, 2014 at Maryland, USA   |
| 21 | Shramanth R Rajarathnam | 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  |





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| 22 | Nilavra<br>Bhattacharya        | IIST, Shibpur  | Fractal Image<br>Compression Using<br>Hierarchical<br>Classification Of<br>Sub-Images.               | VISAAP - 2015- 10th<br>International Conference on<br>Computer Vision on Mar 11-14,<br>2015 at Berlin, Germany.   |
| 23 | Shikher S<br>Bhandary          | MS Ramaiah<br>Institute of<br>Technology,<br>Bangalore                               | Experimental study of<br>a biofuel engine and<br>its validation through<br>mathematical modelling.   | The Energy and Materials<br>Research Conference<br>(EMR2015) on Feb 25-27,<br>2015 at Madrid, Spain   |
| 24 | Arpan Sen                      | Indian Institute of<br>Engineering<br>Science &<br>Technology,<br>Shibpur            | Achieving Data<br>Survivability and<br>Confidentiality in<br>Unattended Wireless<br>Sensor Networks. | The 29th IEEE International<br>conference on Advanced<br>Information Networking &<br>application (AINA-2015)<br>on Mar 24-27, 2015 at<br>Gwangju, Korea |
| 25 | Santosh<br>Kumar<br>Chaturvedi | Sardar Patel<br>College of<br>Engineering,<br>Mumbai                                 | Maglev Wind<br>Generator: An efficient<br>form of vertical axis<br>wind turbine.                     | The 6th International Renewable<br>Energy Congress (IREC 2015)<br>on Mar 24-26, 2015 at Sousse,<br>Tunisia, Africa                                      |
| 26 | Shubham Jain                   | Swami Vivekanand<br>Institute of<br>Technology,<br>Management &<br>Gramothan, Jaipur | A Force- Controlled<br>Portrait Drawing Robot  | 2015 IEEE International<br>Conference on Industrial<br>Technology (ICIT2015)<br>on Mar 17-19, 2015 at Seville,<br>Spain                                 |

## 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 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, 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 are given below:

| S. No | Name                | College/ Institution           | Title of the Paper  | Name of the Event, Date & Venue  |
|-------|---------------------|--------------------------------|---|--|
| 1     | Harshal Agarwal     | VNIT Nagpur                    | Al-0.6 wt. % Sc Alloy Processed through spray Forming and Powder Metallurgical Routes                                 | TMS 2014 : 143rd Annual Meeting & Exhibition on Feb 16-20, 2014 at San Diego, California, USA                                |
| 2     | Shayandev Sinha     | IIT Kanpur                     | Full Contact of a Flat Punch with a Wavy Adhesive Thin Film   | Adhesion Society Annual Meeting – 2014 on Feb 23-26, 2014 at San Diego, California, USA                                      |
| 3     | Debayan Ghosh       | NIT Durgapur                   | Effects of Accelerated Ageing on the Adhesive Bond between Concrete Specimens and External GFRP Reinforcements        | 1st International Conference on Ageing of Materials and Structures, AMS 2014 on May 26-27, 2014 at TU Delft, The Netherlands |
| 4     | Aditya Singh        | IIT Kanpur                     | A Via-less Planar Quad-band Monopole Antenna Employing Complementary Split Ring Resonator and Inter Digital Capacitor | 8th European Conference on Antennas and Propagation on Apr 6-11, 2014 at The Hague, The Netherlands                          |
| 5     | Ishan Arora         | IIT Delhi                      | Aggregation Kinetics for Monoclonal Antibody Products   | International Conference on Chemical and Food Engineering on Apr 4-5, 2014 at Dubai, UAE                                     |
| 6     | Bachu Saiphaneendra | IIT BHU, Varanasi              | Characterization of Rapidly Solidified Soft Magnetic (Ni <sub>1-x</sub> Fe <sub>x</sub> ) 88Zr7B4Cu1 Alloys           | 2014 MRS Spring Meeting on Apr 21-25, 2014 at San Francisco, USA   |
| 7     | Jason Abu Mathews   | Sathyabama University, Chennai | M.A.T.R.I.X. Manned Amphibious Tracked Indian Explorer  | OCEANS 2014 MTS/IEEE Conference on Apr 7-10, 2014 at Taipei, Taiwan  |
| 8     | Meher Kalyan        | IIT –Hyderabad                 | Switching Panels for Complete Utilization of Battery Banks in Multi-level Inverters for PV System                     | 14th International Conference on Environmental and Electrical Engineering on Jun 10-12, 2014 at Krakow, Poland               |
| 9     | S D Khivsara        | IISc, Bangalore                | Development of a Ceramic Pressurized Volumetric Solar Receiver for Supercritical CO <sub>2</sub> Brayton Cycle        | ASME 2014 8th International Conference on Energy Sustainability on Jun 30- Jul 2, 2014 at Boston, MA, USA                    |



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|----|--------------------------|---|---|--|
| 10 | Gaurangi Gupta           | IIT Kanpur                                  | A Broadband Dipole on a Double Layered Via-less High Impedance Surfaces   | 2014 -International Symposium on Antennas and Propagation on Jul 6-11, 2014 at Tennessee, USA  |
| 11 | AK Mishra                | IIT Patna                                   | Mathematical Modeling of Electromagnetic Levitation Based Active Suspension using Bond Graph  | International Conference on Mechanical, Automotive and Materials Engineering on May 26-28, 2014 at Singapore   |
| 12 | Aditya Dalakoti          | IIT Ropar                                   | Analytical Model for Inverter Design using Floating Gate Graphene Field Effect Transistors  | IEEE Computer Society Annual Symposium on VLSI 2014 on Jul 9-11, 2014 at Tampa, Florida  |
| 13 | Shanu Jain               | IIT Bombay                                  | Design of ionic Liquid in extraction of Pharmaceutical Intermediate   | 2nd International Conference on Ionic Liquids in Separation and Purification Technology on Jun 29-Jul 2, 2014, at Toronto, Canada                      |
| 14 | Mr. Vatsal Sharan        | IIT Kanpur                                  | Large Deviation Property of Waiting Times for Markov and Mixing Processes   | IEEE International Symposium on Information Theory (ISIT) 2014 on Jun 29-Jul 4, 2014 at Hawaii, USA  |
| 15 | Mr. Ashish Kulkarni      | IIT Kanpur                                  | Structural and Photoluminescence Properties of Solution-Combustion synthesized Ba <sub>13</sub> Al <sub>22</sub> Si <sub>10</sub> O <sub>66</sub> : Eu <sup>3+</sup> nano phosphors | 17th International Conference on Luminescence and Optical Spectroscopy of Condensed Matter (ICL2014) on Jul 13-18, 2014 at Wroclaw, Poland             |
| 16 | Mr. Manjunath CR         | IIT Madras                                  | Analysis of Pressure Pulsations in the Intake Duct of a Single Cylinder Diesel Engine   | 4th Joint US-European FEDSM and 12th International Conference on Nanochannels Microchannels and Minichannels on Aug 3-7, 2014 at Chicago, Illinois USA |
| 17 | Mr. Krishna Kumar Saxena | IIT Guwahati                                | Formability Characterization of Aluminium Lithium Alloys Used in Spacecraft Industry  | ASME 2014 International Mechanical Engineering Congress & Exposition on Nov 14-20, 2014 at Montreal, Canada  |
| 18 | Mr. Sunny Sanyal         | Guru Nanak Institute of Technology, Kolkata | Automatic switching of home appliances one sensor to many systems approach.   | ICRERA-2014 on Oct 19-22, 2014 at Milwaukee, USA   |



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|----|---------------|------------------------|--|---|
| 19 | V Neeharika   | BITS-Pilani, Hyderabad | Novel optical MEMS pressure sensors incorporating waveguide bragg gratings on diaphragms.  | IEEE SENSORS-2014 on Nov 3-5, 2014 at Valencia, Spain   |
| 20 | Ankit Yadav   | IIT, Indore            | Renewable energy system for building applications in a mild climate  | International Conference on Renewable Energy Technologies (ICRET 2014) on Nov 7-8, 2014 at Hong Kong  |
| 21 | Mohit Arora   | IIT Bombay             | Combined Hydrometallurgical Approach towards Metal Recovery from Printed Circuit Boards: An Organised Technique for Unorganised recyclers in Electronic Waste Management | 2014 E-waste Academy - Scientists Edition (2014 EWAS) on Nov 1-7, 2014 at Shanghai, China   |
| 22 | Rohit Supekar | IIT Madras             | Stability of a rolling fluid filled cylinder.  | 67th Annual Meeting of the APS Division of Fluid Dynamics Scheduling Notice APS Meetings on Nov 23-25, 2014 at San Francisco, California, USA |
| 23 | Anchal Goyal  | IIT Kanpur             | Experimental analysis of the structural and functional fatigue in shape memory alloy Nitinol wires when subjected to cyclic thermo-mechanical loading                    | International Conference on mechanical properties of materials on Dec 18-20, 2014 at Barcelona, Spain   |
| 24 | Akshay Modi   | IIT Kanpur             | Development of Nitrogen-doped Multi-scale Web of Carbon Micro-Nanofibers in One-Step Method  | 4th International Conference on Multifunctional, Hybrid and Nanomaterials on Mar 9-13, 2015 at Sitges, Spain                                  |



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| 25 | M Ramesh Krishna       | IIT Indore               | An Innovative Genetic Programming Framework in modeling a real time Epileptic Seizure detection system         | 3rd ASE International Conference on Biomedical Computing on Dec 14-16, 2014 at Cambridge USA               |
| 26 | Mr. Rohit Gupta        | IIT, BHU, Varanasi       | Energy Efficient ceramic electrolyte fuel cell system with enhanced power density for intermediate temperature | Global conference on energy and sustainable development GCESD 2015 on Feb 24-26, 2015 at Coventry, UK      |
| 27 | Aditya Chauhan         | IIT Mandi                | Non-linear electro-mechanical energy conversion in ferroelectric single crystals                               | The energy and materials Research Conference 2015 on Feb 25-27, 2015 at Madrid, Spain                      |
| 28 | Monisha Kanakaraj      | NIT Surathkal Karnataka  | Performance Analysis of Ensemble Methods on Twitter Sentiment Analysis using NLP Techniques.                   | 9th IEEE International Conference on Semantic Computing (ICSC 2015) on Feb 7-9, 2015 at California, USA    |
| 29 | Vaibhav Vishnu Gholase | IIT Bombay               | Design of Efficient BLDC motor for DC operated Mixer-Grinder   | 2015 IEEE International Conference on Industrial Technology on Mar 17-19, 2015 at Seville, Spain           |
| 30 | Siddharth Buddhiraju   | IIT Bombay               | On thermoelectric Pure spin currents in coulomb blockaded quantum dots.  | American Physical Society's March Meeting 2015 on Mar 2-6, 2015 at San Antonio, Texas, USA                 |
| 31 | Subhasankar Dwibedi    | NIT Surathkal, Karnataka | Development of a Novel Vibration Absorber Utilizing Smart Elastomer for Damping of Torsional Vibration         | 4th International Engineering Symposium (IES2015) on Mar 4-6, 2015 at Kumamoto University, Japan.          |
| 32 | Niladri Chatterji      | IIT Mumbai               | Proposal for a spin-transfer torque device based on resonant tunnelling  | American Physical Society's March Meeting 2015 on Mar 2-6, 2015 at San Antonio, Texas, USA                 |
| 33 | Varun Bhatt            | IIT Kanpur               | Shape Optimization of Corrugated Airfoils.   | The 18th International Conference on Finite Elements in Flow Problems on Mar 16-18, 2015 at Taipei, Taiwan |



## **National Competition on Innovations in Manufacturing Practices - 2015 (IMP-2015)**

The second National Competition on “Innovations in Manufacturing Practices - 2015” (IMP-2015) jointly organized by INAE and IIT Kanpur was held at IIT Kanpur on March 20, 2015. The objective of the competition is to spark the awareness amongst the young, dynamic and energetic students of different engineering fields at U.G. and P.G. levels in the country, about the importance of manufacturing in general, and innovative manufacturing practices in particular. In keeping with the spirit of promoting innovations and manufacturing in engineering profession, BHEL had consented to be a co-sponsor of the event this year.



## Event Organized by Local Chapters

### INAE Mumbai Local Chapter

INAE Mumbai Local Chapter organized a talk on “Engineering a Sustainable Energy Future” which was delivered by Prof. Rakesh Agrawal, FNAE, Fellow AAAS, Fellow NAE, Purdue University, West Lafayette, IN, USA on Thursday, 9th October 2014 at FC Kohli Auditorium, KReSIT Building, IIT Campus, Powai, Mumbai. The talk was attended by about 130 persons, including about 10 Fellows of INAE Mumbai Chapter.

Prof. Rakesh Agrawal, a world renowned expert on energy, and a recipient of the National Medal of Technology from the President of the United States in 2011 for his work in the field of energy, gave a broad talk covering many important advances in energy by his group at Purdue University. He first presented some results from energy systems modeling, highlighting the synergistic interactions that exist for transportation sector and production of chemicals. This was followed by a brief discussion and analysis of candidate processes to produce hydrogen from solar energy and modeling results for energy storage at the GW-hour levels. He said that an exciting aspect of producing fuels and chemicals from biomass is learning to produce the array of molecules that are needed with minimum process transformation steps and energy use while maximizing biomass carbon recovery. He showed the new pathways and the associated catalysts that have been developed for the production of fuel and chemicals. On the sun to electricity front, Prof. Agrawal presented highlights of his research on thin film solar cells via nanocrystal ink based route. He discussed process and technical solutions leading to power conversion efficiencies that are among the highest for  $\text{Cu(In,Ga)Se}_2$  and  $\text{Cu}_2\text{ZnSnSe}_4$  based solar cells by solution based routes.

### INAE Kolkata Local Chapter

As part of the National Science Day celebrations 2015, INAE Kolkata Local Chapter organized a lecture session at Heritage Institute of Technology, Kolkata on Feb 18, 2015 wherein Prof Nikhil R Pal, FNAE and Prof Sanghamitra Bandyopadhyay, FNAE both from Indian Statistical Institute Kolkata delivered lectures on “Sensor/feature Selection with Controlled Redundancy Using Neural Networks” and “Optimizing Multiple Objectives for Clustering” respectively. The abstracts of the lectures by Prof Nikhil R Pal and Prof Sanghamitra Bandyopadhyay are given below.

Prof Nikhil R Pal, during his lecture on “Sensor/feature Selection with Controlled Redundancy Using Neural Networks” highlighted that while designing many industrial systems, there is a need to minimize the required number of sensors at least for three reasons: reduce the cost of the system; reduce the cost of decision making; and honour physical constraints imposed by the specific application. For example, it may not be possible to equip an “intelligent welding robot” with too many sensors because of the constraints on the welding environment and the limited available time for decision making. Hence, sensor selection, a generalization of feature selection, is a very important problem.

During the lecture on “Optimizing Multiple Objectives for Clustering”, Prof Sanghamitra Bandyopadhyay mentioned that clustering is an unsupervised exploratory data analysis tool with applications in numerous domains. It is essentially an NP-hard grouping problem with a complex and highly multimodal search space. Metaheuristic methods like genetic algorithms and simulated annealing have been earlier used in





clustering since the 1990s. In these approaches, the clustering problem is posed as one of searching for a suitable set of cluster prototypes and/or partitions such that some compactness or dispersion criteria is optimized. It has been found that optimizing multiple criteria instead of a single, arbitrarily chosen one, is beneficial especially when the data contains clusters of different characteristics. Hence application of multi-objective metaheuristics has been attracting the attention of researchers.

In addition, one-day “Workshop on Modern Techniques and Technologies in Electronics and Computer Engineering” was also organized at St. Thomas’ College of Engineering and Technology, Kolkata on Feb 21, 2015. Prof Debatosh Guha, FNAE, Institute of Radio Physics and Electronics, University of Calcutta delivered a lecture on “Antenna Engineering which Transformed the Technology” and Prof. Bhargab B Bhattacharya, FNAE, Indian Statistical Institute, Kolkata made a presentation on the topic “3D Integrated Circuits: Design and Test Challenges”

### **Establishment of INAE Bhubaneswar Local Chapter**

INAE Local Chapter at Bhubaneswar has been established and functional at SOA University, Bhubaneswar to carry out various activities enshrined in the Ordinance on INAE Local Chapters. During the first meeting of the Chapter held on October 11, 2014, Prof. Damodar Acharya and Prof. Ganapati Panda were elected as Chairman and Secretary General of the INAE Bhubaneswar Local Chapter respectively.

INAE Bhubaneswar Local Chapter in association with SOA University, Bhubaneswar celebrated the National Science Day in February 2015 and organized Science Day Lectures Series on the theme on “Design, Manufacturing Science and Technology”. Through this series, the newly opened Bhubaneswar Local Chapter took the lead to promote the theme, appropriate to the “Make in India” theme of the nation, among professional engineers, students and academic fraternity of the locality. Four eminent fellows of INAE, delivered the lectures as detailed below.

1. Prof Sivaji Chakravorti, Dept. of Electrical Engg, Jadavpur University, Kolkata delivered lecture on “Gas Insulated Lines – New Age Technology for Bulk Power Transmission” on 21<sup>st</sup> February 2015.
2. Prof P K Mishra, Dept. of Mechanical Engineering, IIT, Bhubaneswar delivered lecture on “A Concept Towards Flexible Manufacturing Workstation for 21<sup>st</sup> Century – Made in India” on 26<sup>th</sup> February 2015.
3. Prof M K Tiwari, Dept. of Industrial Engg, IIT, Kharagpur delivered lecture on “Design for Manufacturing: Product and Process Platform Based Approach” on 27<sup>th</sup> February 2015.
4. Capt NS Mohan Ram, Advisor (Technical) TVS Motors, Chennai delivered lecture on “New Product Development (NPD) : Process, Concept and Case Study” on 28<sup>th</sup> February 2015.

The abstract of the lectures delivered by above Fellows of the Academy are as under.



*Prof. Sivaji Chakravorti, Fellow INAE, delivering Science Day Lecture*

Prof. Sivaji Chakravorti highlighted the uniqueness of this new age technology for bulk power transmission at very high voltage through difficult terrain for short distances, its design, its installation, its operation, its monitoring and its maintenance challenges and the ways they are overcome. Examples from his first hand experiences and illustrations on the use of this technology in various countries made the lecture very interesting and kept the audience spell bound.



*Prof. Mishra, Fellow INAE, Delivering Science Day Lecture*

The second lecture in the series, was on “Flexible manufacturing work station for 21<sup>st</sup> century, a concept-made in India”. It was delivered by Prof. P.K. Mishra, Professor in School of Mechanical Science, IIT, Bhubaneswar (Former Professor of Mech. Engineering, IIT Kharagpur). His talk on “Flexible manufacturing work station” focused on Laser manufacturing workstation capable of machining variety of jobs that he has developed at IIT, Bhubaneswar. His innovative workstation machines complex products made out of different materials by controlling laser energy and contour path. The machine is computer controlled. His machine in a brief-case can also do in-situ metal removal and metal joints on large work pieces as required, either by laser beam machining or by laser beam



*Prof. Tiwari, Fellow INAE, Delivering Science Day Lecture*

The third lecture in the series was on “Design for manufacturing: Product and Process Platform based Approach” was delivered by Prof. Manoj Kumar Tiwari, Professor & Head of Industrial Engineering & Management Department of IIT Kharagpur. He focused on the modular concept of designing products, through permutation and combination of different modules to make products suiting to the specific market requirements within the shortest possible time. He gave the example of TATA MOTOR’s success in China in bring out a product appropriate for Chinese market within a very short period of three months and many others. The talk was an eye opener to the audience.



*Capt Mohan Ram, Fellow INAE,  
Delivering Science Day Lecture*

The last and final lecture was on “New Product Development (NPD) : Process, Concept and Case Study” by Capt NS Mohan Ram, Advisor (Technical) TVS Motors, Chennai. His absorbing talk focused on the development of TVS Scooty as an example to describe the complex product development process by using quality function deployment, failure mode effect analysis, extensive field trials for improved reliability etc in making a new product that ensures customer’s delight and its launching.

## International Affairs

### CAETS Annual Meetings and Convocation on June 1-4, 2014 at Beijing, China

CAETS Annual Meetings and Convocation was hosted by Chinese Academy of Engineering and held from June 1-4, 2014 at Beijing, China. Since INAE is to host the CAETS Annual meetings and Symposium for the year 2015, a comparative larger delegation than in the past years attended these events at Beijing. INAE delegation was led by Dr. Baldev Raj, President, INAE and President-Elect, CAETS with Dr. KV Raghavan, Vice-President, INAE & Chairman, CAETS 2015 Organizing Committee; Dr. Sanak Mishra, Vice-President, INAE & member, CAETS 2015 Organizing Committee; Dr. Prasun K Roy, FNAE; Prof. Souvik Bhattacharyya, FNAE and Brig Rajan Minocha, Executive Director, INAE as members of INAE delegation.

Dr. Baldev Raj was an invited key-note speaker and delivered a talk during the Plenary Session. In addition, Dr. KV Raghavan, Dr. Prasun K Roy and Prof. Souvik Bhattacharyya delivered talks in three Technical Sessions, viz., The Future of Chemical, Metallurgy and Material Engineering; Translational Medicine and the Future of Human Health; and The Future of Mechanical Engineering respectively.



*Dr. Baldev Raj, President, INAE addressing during CAETS event at China*

### CAETS Executive Committee and Board of Directors Meetings on June 1, 2014

The meetings of the CAETS Executive Committee and Board of Directors were held on June 1, 2014 and attended by Dr. Baldev Raj as President-Elect, CAETS & President, INAE and Brig Rajan Minocha, Executive Director, INAE. Besides the CAETS Agenda which was discussed, Dr. Baldev Raj briefed the members of the CAETS Executive Committee and subsequently the members of the Board of Directors on the progress for preparation of CAETS 2015 Convocation and the related activities from October 12-15, 2014 at New Delhi. The salient points covered in his brief were as under.





- (a) The venue for the CAETS events has been finalized as Hotel Ashok, New Delhi.
- (b) The theme of the conference is “Pathways to Sustainability: Energy, Mobility and Healthcare Engineering”.
- (c) The technical events of the convocation consists of a plenary session with lectures from eminent engineers of international repute, three parallel Technical Tracks, viz., Energy Engineering, Mobility Engineering and Healthcare Engineering with keynote lectures by international experts. A valedictory session will summarize conference conclusions.
- (d) Young engineers (below 45 years) will be invited to participate in the convocation and deliver lectures during the technical tracks mentioned above. In order to encourage participation of young engineers, a Poster Presentation Competition would also be held on the sidelines of the Convocation, for which suitable prizes would be given. A partial travel support will be provided by INAE to the young engineers who are unable to obtain the same from their parent organization for participating in the CAETS 2015.
- (e) A technical visit to demonstrate the outstanding engineering facilities relevant to the sub-themes, viz., Energy/Mobility/Healthcare will also be organized on the second day of the convocation.
- (f) An optional excursion to Taj Mahal at Agra will be organized on 15<sup>th</sup> October 2015.

Dr. Baldev Raj then briefed the members on the Topics for Discussion during the next CAETS Council meeting on October 14, 2015. The topics discussed and finalized are ‘Light Based Technologies’ and “Academy Operations”.

### **CAETS Energy Committee meeting on June 1, 2014**

CAETS had constituted a Working Group for Study on “Transitioning to Low Carbon Economy – Engineering Opportunities in Building and Transport Sectors” wherein Dr. Baldev Raj is the Chairman of CAETS Energy Committee, besides Dr. KV Raghavan as one of the members, eleven Member Academies have nominated their Reps to form part of this Committee.

The Committee has been interacting to compile the report and also had a meeting in Cape Town on Nov 29-30, 2013. Based on the inputs received, a draft report after review had been compiled by INAE drafting committee comprising of Dr. Baldev Raj, Dr. KV Raghavan, Dr. Purnendu Ghosh, Dr. BM Reddy, Dr. B Chandrasekharam and Dr. Geetanjali Sawhney as members. The Reviewers/Subject Experts were Dr. Vaughan Beck, ATSE, Dr. Philip Lloyd, SAAE, Dr. Frank Behrendt, acatech, Dr. R Rolf Hugli, SATW, Dr. Peng Suping, CAE and Dr. KV Raghavan, INAE.

The draft Report based on the inputs from the members of CAETS Energy Committee was circulated prior to the meeting for review and comments by members. After briefing by Dr. Baldev Raj, Chairman of the Committee, Dr. KV Raghavan made a brief presentation on the draft Report.

Salient features of the draft Report on “Transitioning to Lower Carbon Economy – Engineering Opportunities in Building and Transportation Sectors” discussed during the CAETS Energy Committee are given below.

- This is the 3<sup>rd</sup> CAETS Report on low carbon energy economy (LCE). While the first two reports focussed on LC technologies for electric power generation covering technological, socio-economic & managerial issues and the role of CAETS in promoting their cause, this report will look at the



transition process to LCE in building and transport sectors, which are most important from socioeconomic and environmental point of view.

- The report considers the engineering and allied factors responsible for enhancing the energy efficiency and reducing the GHG emissions and targets the leadership of the stakeholding agencies responsible for planning, policy making, academic and engineering R&D, equipment/system manufacture and regulations in building and transport sectors.
- Major attention is given to GHG emission reduction potential, engineering opportunities in evolving energy efficient systems, case studies of world's most energy efficient systems and ways and means of overcoming the technological, economic and societal barriers.
- The report finally identifies various measures to be taken for a successful transition to LCE which include national and international drivers for LCE, important components of a transition process, implementable actions on evolving growth plans, policy and regulatory frameworks, strategies for handling uncertain situations and establishing a viable hierarchy of technology priorities.
- Attempts have also been made to identify areas in which CAETS can play a facilitating role in evolving plans / programmes for smooth transition to LCE.

These were then deliberated by the members and the suggestions invited for refining the draft report to make it suitable for adoption by all Member Academies. Based on deliberations, the suggestions have now been invited on the following.

- (a) The likely Engineering Pathways to be adopted for meeting the specific technological options relevant to residential/commercial buildings and road/air/rail/marine transport sectors during the transition to LCE.
- (b) Country specific experiences on planning / execution / management of engineering activities during technological transition to LCE.

The Energy Committee decided to work out the requirement as per suggested action and discuss the same during the next meeting of the CAETS Energy Committee in Berlin in November 2014. Dr. Frank Behrendt from acatech has kindly accepted to host the meeting. The Report will then be finalized and released during the CAETS 2015 events at New Delhi.

## **CAETS Symposium on ‘Engineering and the Future of Humankind on June 2-3, 2014**

CAETS Symposium on ‘Engineering and the Future of Humankind was held on June 2-3, 2014 at Beijing. The opening ceremony of ICEST 2014 was held on June 2, 2014 which was followed by the Plenary Sessions by eminent engineers/scientists across the world. Dr. Baldev Raj, President, INAE delivered a talk during on the plenary session on “Science & Technology of Advanced Sodium Cooled Fast Spectrum Reactors in Context of Energy Sustainability in 21st Century”. He talked about the challenges relating to materials and manufacturing for sodium cooled fast reactors and thermonuclear fusion reactors. Benchmark successes, in the global context, were narrated. Solutions to challenges required synergy among theoretical physicist, computational chemists, material scientists, metallurgists and engineers with almost all domains of expertise along with foresight and effective management.



The Symposium was conducted in nine parallel sessions on the topics as under.

- The Future of Mechanical Engineering
- Information Network and Social Development
- The Future of Chemical, Metallurgy and Material Engineering
- Sustainable Development of the Energy and Mining Engineering
- Civil Engineering and the Future of Humankind
- Environment and Green Development
- Agricultural Science and Food Security
- Translational Medicine and the Future of Human Health
- Engineering Philosophy *vs.* Engineering Management



*CAETS Symposium in progress at China*

During the Symposium, three presentations were made by INAE delegates as under.

- (a) A presentation was made by Dr. KV Raghavan, Vice-President, INAE at Icest 2014 on June 3, 2014 during one of the parallel sessions on “The Future of Chemical, Metallurgy and Material Engineering”. The presentation demonstrated how the Future Product / Process Development Challenges in Chemical and material and allied Engineering Fields and other engineering advances have changed the complexion of chemical and material fields in terms of predicting and improving their performance under the influence of process constraints typically encountered in commercial manufacture.
- (b) A presentation was made by Prof. Prasun K. Roy, FNAE & Director, National Brain Research Centre, Delhi at Icest 2014 on June 3, 2014 during one of the parallel sessions on “Translational

Medicine and the Future of Human Health” on the topic of The Ageing Brain Project & International Brain Grids: Tissue Mechanics as a key to Healthy Lifespan for a Greying World. The presentation focused the promising potentiality of bioengineering and fluidics strategies to intervene at the early stages of brain ageing disorders etc. and needs a strong collaboration between engineers (chemical, computing, biomedical), physicians and scientists.

- (c) A presentation was made by Prof. Souvik Bhattacharyya, FNAE & Deputy Director, IIT Kharagpur at ICEST 2014 on June 3, 2014 during one of the parallel sessions on “Future of Mechanical Engineering”. The future mechanical engineering education will exhibit a pervasive practice-based curriculum with broader, multi-disciplinary and flexible approach that is systems-focused and that integrates content, including humanities and social sciences, and communication skills; it is envisaged to emphasize globalization, quality of life issues, and solving society’s grand challenges.

### CAETS Council Meeting on June 4, 2014

The CAETS Council meeting was held on June 4, 2014. During the Council meeting, Dr. Baldev Raj gave a brief presentation regarding the CAETS Annual meetings and Convocation, to be hosted by INAE during October 12-15, 2015 at New Delhi. It was mentioned that the theme of this Convocation would be “Pathways to Sustainability: Energy, Mobility and Healthcare Technologies”. The suggested focus areas under each of the sub themes, i.e., Energy, Mobility and Healthcare Technologies were projected and views/suggestions on these were invited. Further, Member Academies of CAETS were requested to nominate a suitable expert for each of these sub-themes to make presentations during the Convocation. The progress for preparation of CAETS 2015 Convocation and the related activities from October 12-15, 2015 at New Delhi were presented.



*INAE delegation participating in  
CAETS Council Meeting at China*





*CAETS Council Meeting in progress*

Dr. KV Raghavan then briefed the Council on the progress of the CAETS Energy Committee meeting held on the same day and the decision taken to further progress the Report. There were two topics listed for discussion during the Council, viz., ‘Advanced Manufacturing’ and ‘Fracking’. Dr. Baldev Raj made a presentation on ‘Advance Manufacturing’ wherein it was mentioned that India has a mega opportunity in Advanced Manufacturing Technologies through public private partnership. Global partnerships have been a huge success stories in India. Many global large players in manufacturing have advanced engineering industries and R&D Centers which continue to show better results than their counterparts in other parts of the world. INAE synergizes with Confederation of Indian Industry, Department of Science and Technology, Planning Commission etc. on the matters related to advanced manufacturing. INAE also collaborates with other Engineering Academies of the world such as RAE, UK, ACATECH on advanced materials, virtual manufacturing, big data in manufacturing, etc on a sustained basis to find new directions and create opportunities to crystallize collaborations of high merit in advanced manufacturing.

The Council was then informed regarding the topics of discussion for the CAETS Council meeting during 2015. The following two topics discussed and recommended by the Board of Directors and were approved by the CAETS Council.

**(a) Light Based Technologies**

The year 2015 has been proclaimed as the international year of light by the Executive Board of UNESCO in its 190<sup>th</sup> Session held in October 2012. Light based technologies have played a major contribution to the growth of several engineering fields. CAETS will become world’s first engineering academy to support the above initiative. It will also be very appropriate for CAETS to support above theme during one of its discussion topics during council meeting in 2015.

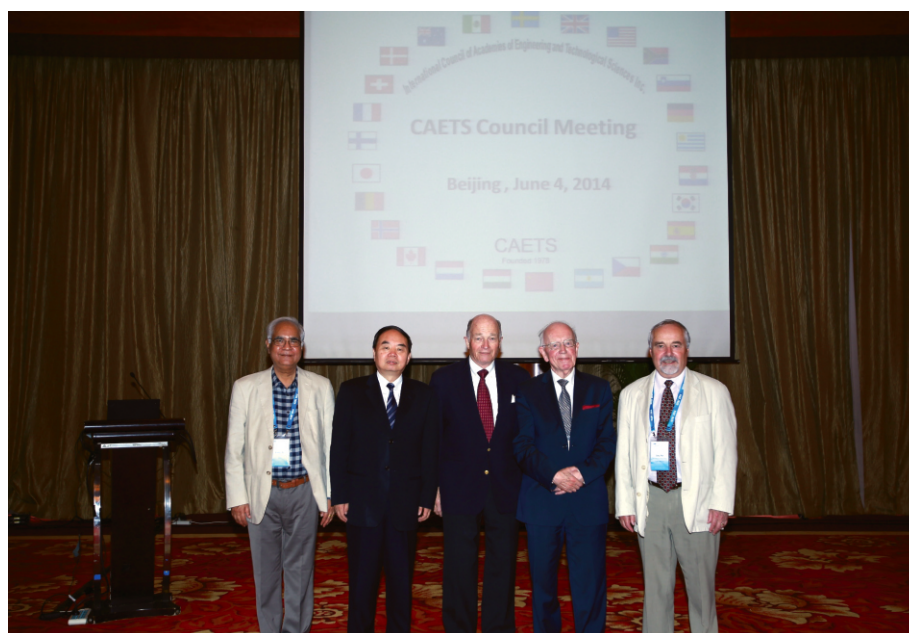
**(b) Academy Operations**

It was recommended by the Board of Directors that there is a need for the Member Academies to benefit mutually from each other’s experience about the functioning and operation of the Academies.

All members of the CAETS Council were invited to attend the CAETS Convocation 2015 at New Delhi from October 12-15, 2015.

## **Collaborative Activities with CAETS Member Academies**

Having signed MoUs with a number of CAETS Member Academies, INAE has initiated programs on specific areas which would be progressed further so as to achieve meaningful collaboration on the identified topics. INAE has initiated joint collaborative programs with Canadian Academy of Engineering on “Clean Coal Technologies”; with Australian Academy of Technological Sciences and Engineering (ATSE) on “Solar Energy” with Royal Academy of Engineering, UK on “Virtual Manufacturing”; with National Academy of Technology, France on “Affordable Healthcare Technologies”; and with Chinese Academy of Engineering on “Young Engineering Leaders Conclave”.



*Dr. Baldev Raj along with the Board of Directors during CAETS 2014*

A number of meetings of INAE delegation were held with the CAETS Member Academies on the sidelines of CAETS events at Beijing during June 2014 and the details are as under.

### **Meeting with Australian Academy of Technological Sciences and Engineering (ATSE) on June 1, 2014**

A meeting with Australian Academy of Technological Sciences and Engineering (ATSE) was held on June 1, 2014. Dr. Alan Finkel, President and Dr. Vaughan Beck, Fellow from ATSE and Dr. Baldev Raj, President, Dr. KV Raghavan, Vice-President, Prof. Souvik Bhattacharyya, Fellow and Brig Rajan Minocha, Executive Director from INAE participated.

Dr. Vaughan Beck briefed that the current proposal of One MW Solar Biomass Hybrid Power Cum Poly Generation with Dr. RR Sonde as Coordinator has not been possible to progress further due to non-availability of fund support from the Australian Government. Dr. Vaughan Beck proposed that as an alternative, the proposal submitted vide an email dated 28<sup>th</sup> May 2014 wherein Centre for Appropriate Technology (CAT) in Australia has been undertaking some appropriate Energy Projects in India may be





considered. CAT is also involved in “Bushlight India” Village Electrification Project which provided reliability, affordability and equitable access to electricity in Indian villages. It was suggested that ATSE and INAE could explore if there is potential merit for the Academies taking a possible role in this emerging development by associating with the project.

Dr. Baldev Raj appreciated the new project and concurred on exploring the feasibility of the two Academies to be involved in the on-going projects of CAT. However, Dr. Baldev Raj felt that there is a definite need to pursue the earlier project proposal which has been progressed considerably. Dr. Alan Finkel agreed and suggested if it was possible for Dr. RR Sonde to visit Australia to work out a strategy to progress the project further. He also mentioned that in order to derive maximum benefit from the visit of Dr. Sonde, an invited talk could be organized at Monash University, Australia. Dr. Baldev Raj confirmed that Dr. Sonde can visit Australia as there is a definite need to progress the project further. Dr. Sonde and Dr. Vaughan Beck would be in touch to finalize the future course of action.

### **Meeting with National Academy of Technologies of France (NATF) on June 2, 2014**

A meeting with the National Academy of Technologies of France (NATF), France was held on June 2, 2014. Dr. Bruno Revellin-Falcoz, Honorary President from NATF and Dr. Baldev Raj, President, Dr. KV Raghavan, Vice-President, Dr. Sanak Mishra, Vice-President, Prof. Prasun K Roy, Fellow and Brig Rajan Minocha, Executive Director from INAE participated.

The present state of preparation for the joint workshop on ‘Technology and Healthcare’ to be held at Paris from October 15-16, 2014 were discussed. Dr. Bruno Revellin-Falcoz confirmed that the programme conceptualized and discussed with Dr. Rajeev Shorey, Coordinator in January 2014 is proceeding as per decisions taken. The proposal for the joint workshop has been accepted and the necessary funding is available. This event will be held at Genopole, France which is about 60 km from Paris.

During the two-day event, besides the invited talks, the visits to the labs will also be coordinated. These visits would be organized on day one of the workshop so as to indicate to the participants the level of facilities available in the healthcare sector in France. The details of the workshop with respect to speakers and scheduling of the sessions would be coordinated with Dr. Rajeev Shorey.

Dr. Baldev Raj highlighted that besides the participants from INAE, efforts are under way to have experts from GE Healthcare, Shankar Netralaya and other industries in India to participate in the deliberations. The aim of the workshop is to bring out meaningful and tangible conclusions for progressing further by the respective countries for mutual benefits.

### **Meeting with Chinese Academy of Engineering (CAE) on June 3, 2014**

A meeting with Chinese Academy of Engineering (CAE) was held on June 3, 2014. Dr. ZHOU Ji, President, CAE and Dr. Baldev Raj, President, Dr. KV Raghavan, Vice-President, Dr. Sanak Mishra, Vice-President, and Brig Rajan Minocha, Executive Director from INAE participated.

INAE proposal for the conduct of Young Engineering Leaders Conclave to be held at Indian Institute of Technology, Gandhinagar in January 2015 was discussed. Dr. Baldev Raj informed that Prof. Sudhir K Jain, Director, Indian Institute of Technology, Gandhinagar and Fellow, INAE has been nominated as Coordinator for this programme. A copy of the proposal submitted is attached. Dr. Baldev Raj suggested that the participation of about fifteen young engineers from each country is envisaged. During the Young



Engineering Leaders Conclave, young leaders must 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 duration of the Conclave should be about one week. Other than technical interactions, visits to the adjoining areas would also be organized for the young leaders to absorb rich Indian heritage and culture.

Dr. ZHOU Ji welcomed and appreciated the proposal for conducting the Young Engineering Leaders Conclave and expressed the desire of CAE to participate in this important event. However, Dr. ZHOU Ji reiterated that since CAETS 2015 is to be held in New Delhi from Oct 12-15, 2014 wherein young engineers would also participate, it was proposed that Young Engineering Leaders Conclave be held prior to CAETS 2015 events at Delhi wherein young engineers from CAE could participate in both the events. Dr. ZHOU Ji further suggested that the Conclave could thus be planned sometime in the first week of October 2015 at IIT Gandhinagar. Dr. Daming Fan has been detailed as the Coordinator from CAE and he would be in touch with Prof. Sudhir K Jain to further progress the conduct of this event.

### **Meeting with National Academy of Engineering (NAE), USA on June 4, 2014**

A meeting with National Academy of Engineering (NAE), USA was held on June 4, 2014. Dr. CD Mote, President and Dr. Venkatesh Narayanamurti, Foreign Secretary from NAE and Dr. Baldev Raj, President, Dr. KV Raghavan, Vice-President, Dr. Sanak Mishra, Vice-President, and Brig Rajan Minocha, Executive Director from INAE participated.

It was discussed that both the Academies need to take up the projects on framing of policy related to Engineering Education. Dr. Mote brought out that Grand Challenges initiated by NAE has inspired youth and attracted them to take up 'Engineering', however, has failed to lay out the Way Forward. It was discussed and felt that there is a need to relook afresh on the Engineering Education Policy globally in consultation with the Industry to make it more challenging and acceptable worldwide. Dr. Baldev Raj suggested that there is a need to set-up small teams from each Academy to interact and discuss the terms for engaging both the Academies in this field. Dr. Mote suggested to organize a short Symposium in USA as the first step to layout the road map for long term engagements between NAE and INAE. He recommended Dr. Venkatesh Narayanamurti from NAE as the Coordinator for this short Symposium and accordingly Dr. Baldev Raj will nominate a Coordinator from INAE to work out the details with Dr. Venkatesh Narayanamurti to facilitate the conduct of short Symposium to prepare the road map for future.

### **Meeting with The Royal Academy of Engineering (RAEng), UK on June 4, 2014**

A meeting with The Royal Academy of Engineering (RAEng), UK was held on June 4, 2014. Sir William Wakeham, Senior Vice-President, Dr. John Loughhead, Fellow, Dr. Cuong Dang, Officer and Dr. Mc Hugh Shane, Officer from RAEng and Dr. Baldev Raj, President, Dr. KV Raghavan, Vice-President, Dr. Sanak Mishra, Vice-President, and Brig Rajan Minocha, Executive Director from INAE participated.

The progress regarding the joint workshop on "Distributed (Virtual) Manufacturing Implications for Technology, Management and Business" scheduled from June 16-18, 2014 at London was discussed. Dr. Baldev Raj thanked the RAEng, UK for the schedule finalized for the workshop and confirmed the participation of all the ten delegates from INAE. Dr. Baldev Raj requested the RAEng, UK to consider the following additional points which were then discussed.



- Publication of Post-Proceedings of the workshop. - It was highlighted that in order to carry forward the activities with the Royal Academy of Engineering, UK in the field of “Virtual Manufacturing”, there is a need to bring out Post-Proceedings, based on the deliberations of the workshop. Sir William Wakeham appreciated the suggestion and agreed to the proposal for publication of the Post Proceedings Volume.
- Publish joint statement of the workshop for future course of action by the two Academies.
- Format of Round Table meeting/Panel Discussion scheduled on June 17 and External meetings scheduled on June 18
- To prepare Executive Summary of the workshop
- To invite INAE Foreign Fellows based in London.

## CAETS 2015

### CAETS Convocation on *“Pathways to Sustainability: Energy, Mobility and Healthcare Engineering”*

INAE is a member Academy of the International Council of Academies of Engineering and Technological Sciences (CAETS). CAETS Symposium and Annual Meeting is hosted by one of the CAETS member-Academies each year by rotation which is attended by all member Academies of CAETS. INAE has been requested by CAETS to host the event in 2015. The Core Organizing Committee comprises of Dr. KV Raghavan as Chairman and Dr. Sanak Mishra, Prof. Indranil Manna, Prof. Mahesh C Tandon, Dr. Ajay Mathur, Dr. Rajeev Shorey, Dr. U Kamachi Mudali, Prof. RK Shevgaonkar, Dr. PK Roy, Prof. Geetam Tiwari and Brig Rajan Minocha as members has been constituted for planning and conduct of the event. The CAETS Organizing Committee consists of members of the Core Organizing Committee and the nominated reps from 17 Member Academies of CAETS.

The CAETS Annual Meetings 2015 and Convocation on ‘Pathways to Sustainability: Energy, Mobility and Health Care Engineering’ will be held on Oct 12-15, 2015 at Hotel Ashok, New Delhi. Representatives from 26 Member - Academies of CAETS would be participating in this event. One-third of the strength of the convocation is envisaged to be comprised of young engineers below the age of 45 years. These would form the part of delegations from various Member Academies as well as from India. Poster presentations by young engineers on the sidelines of the Convocation on the two days will be organized. A total of nine awards would be presented to the oral/poster presentations by Young Engineers. A website for the event has been launched and can be viewed at the url [www.caets2015india.in](http://www.caets2015india.in).

The events would comprise of CAETS Board of Directors meeting, CAETS Executive Committee meeting etc. followed by two days Convocation. The topics identified under each sub-theme are as follows:

#### (a) Energy Engineering:

- Potential LCE and efficient energy end use options for large scale deployment
- Hybrid Renewable-Non Renewable Energy (successful cases)



- Nuclear energy through Gen IV and Fusion Reactors
- Smart Microgrids

**(b) Mobility Engineering:**

- Multi-modal connectivity Trends and Futures : Urban and Rural
  - Integrated systems
  - Sustainable mobility core models
- Mobility Case Studies

**(c) Health Care Engineering:**

- Health care devices and delivery systems: Trends and Futures
- Developing Stronger Health care science-technology interface

An Inaugural Session is being planned wherein the President of India/Senior dignitary would be invited. This will be followed by three plenary lectures by eminent international/national experts pertaining to each sub-theme. It is envisaged that three parallel sessions would be organized during two days wherein invited talks by experts/ young engineers would be made. An exhibition to showcase technological advancements of the country and a Poster Presentation Session by Young Engineers below the age of 45 years is being organized. There shall be two prizes for poster presentations in each sub-theme. A panel discussion and valedictory session to sum up the proceedings of the Convocation will be held which would be followed by the technical visit(s).

The CAETS Council meeting will be held after the Convocation. This would be attended by the delegates from various member academies of CAETS. The topic for discussion during this Council Meeting will be “Light Based Technologies” and “Academy Operations”. The year 2015 has been proclaimed as the international year of light by the Executive Board of UNESCO in its 190<sup>th</sup> Session held in October 2012. Light based technologies have played a major contribution to the growth of several engineering fields. CAETS will become the world’s first body of engineering academies to support this initiative. It will also be appropriate for CAETS to support the above theme during one of its discussion topics during council meeting in 2015. In addition, there is a need for the Member Academies to benefit mutually from each other’s experience about the functioning and operation of the Academies which shall form the basis for the second topic of discussion on “Academy Operations”.

A meeting of CAETS 2015 Core Organizing Committee was held on Nov 24, 2014 which was chaired by Dr. Baldev Raj, President, INAE & President-Elect, CAETS. During the meeting, a website designed for the CAETS 2015 Convocation was launched by Dr. Baldev Raj in presence of Dr. William Salmon, Secretary and Treasurer, CAETS, USA. The URL for the website is [www.caets2015india.in](http://www.caets2015india.in)



## The Fellowship

### Newly Elected Fellows

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

#### *Engineering Section-I*

- 1 Prof Mukesh Sharma, Department of Civil Engineering, Indian Institute of Technology, Kanpur.
- 2 Mr. Mangu Singh, Managing Director, Delhi Metro Rail Corporation Ltd., New Delhi.

#### *Engineering Section-II*

- 1 Prof. Chiranjib Bhattacharyya, Department of Computer Science & Automation, Indian Institute of Science, Bangalore.
- 2 Prof. Amit Konar, Department of Electronics & Telecommunication Engineering, Jadavpur University, Kolkata.
- 3 Dr. Ravi Kothari, IBM Distinguished Engineer IBM-IRL, New Delhi.

#### *Engineering Section-III*

- 1 Prof. Naresh Tandon, ITMMEC, Indian Institute of Technology, Delhi.
- 2 Dr. Arunn Narasimhan, Associate Professor, Department of Mechanical Engineering, Indian Institute of Technology, Madras, Chennai.
- 3 Dr. P Sivakumar, Outstanding Scientist (Scientist 'H') and Director, Combat Vehicles Research & Development Establishment (CVRDE), DRDO, Ministry of Defence Chennai.
- 4 Mr. Arun T Ramchandani, Vice-President, Product & Technology Development, Larsen & Toubro Limited Mumbai.
- 5 Dr. N Ravichandran, President & CEO, Lucas-TVS Ltd., Chennai.

#### *Engineering Section-IV*

- 1 Dr. Chandrashekhar Vasant Rode, Chief Scientist, Chemical Engineering & Process Development Division, CSIR-National Chemical Laboratory, Pune.

#### *Engineering Section-V*

- 1 Dr. Bijaya Ketan Panigrahi, Associate Professor, Department of Electrical Engineering, Indian Institute of Technology, Delhi.
- 2 Dr. Sri Niwas Singh, Professor, Department of Electrical Engineering, Indian Institute of Technology, Kanpur.





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

- 1 Dr. Neelesh B Mehta, Associate Professor, Department of Electrical Communication Engineering, Indian Institute of Science, Bangalore.
- 2 Dr. Lalit Kumar, Director, Microwave Tube Research and Development Centre, DRDO, Ministry of Defence Bangalore.

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

- 1 Dr. K Tamilmani, Distinguished Scientist & Director General (Aero), DARE Campus, DRDO, Ministry of Defence Bangalore.
- 2 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 Thiruvananthapuram.

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

- 1 Prof. Indradev Samajdar, Department of Metallurgical Engineering & Material Science, Indian Institute of Technology, Bombay, Mumbai
- 2 Dr. Surendra Kumar Biswal, Chief Scientist and Head, Mineral Processing Department, CSIR-Institute of Minerals and Materials Technology (Formerly RRL), Bhubaneswar.

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

- 1 Prof. Debabrata Das, Department of Biotechnology and Professor-in-Charge, PK Sinha School of Bioenergy, Indian Institute of Technology, Kharagpur.
- 2 Mr. Kamlesh Nilkanth Vyas, Associate Director, Reactor Projects Division, Bhabha Atomic Research Centre, Trombay, Mumbai.
- 3 Mr. SK Chande, Raja Ramanna Fellow, Department of Atomic Energy, Atomic Energy Regulatory Board, Mumbai.
- 4 Mr. B Prasada Rao, Chairman & Managing Director, Bharat Heavy Electricals Ltd., New Delhi.

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

- 1 Dr. S Venkata Mohan, Principal Scientist, Bioengineering and Environmental Sciences (BEES), CSIR-Indian Institute of Chemical Engineering (CSIR-IICT), Hyderabad.
- 2 Dr. DR Prasada Raju, Scientist-G/Adviser and Head-TMC, SEED, KIRAN and GLP, Department of Science and Technology, Government of India, New Delhi.
- 3 Dr. Kiran Mazumdar Shaw, Chairman & Managing Director, Biocon Ltd., Bangalore.

### **Foreign Fellows**

- 1 Dr. Kurt Mehlhorn, Director, Max-Planck-Institute for Informatik, Germany.
- 2 Dr. KR Sreenivasan, Professor, Acting President, Provost, USA.
- 3 Dr. Arun Majumdar, Jay Precourt Provostial Chair Professor, Stanford University, USA.
- 4 Prof. Venkatesh Narayanamurti, Benjamin Peirce Professor, Harvard University, USA.
- 5 Prof. David Franklyn Williams, Professor and Director of International Affairs, Wake Forest Institute of Regenerative Medicine, USA.



## Honours and Awards

### Republic Day Awards

The following INAE Fellows have been conferred with the prestigious award of Padma Vibhushan, Padma Bhushan and Padma Shri on the occasion of the Republic Day on Jan 26, 2015.

#### *Padma Vibhushan*

- Prof MR Srinivasan, Formerly Member, Planning Commission; former Chairman, AEC and Secretary, Department of Atomic Energy; Formerly Adviser, International Atomic Energy Agency; Former Chairman, NPCIL, Mumbai

#### *Padma Bhushan*

- Dr VP Bhatkar, Chairman, ETH Research Lab, Pune and formerly Executive Director, Centre for Development of Advanced Computing (C-DAC)

#### *Padma Shri*

- Dr Prahlada, formerly Outstanding Scientist & Director, Defence Research & Development Laboratory, Hyderabad and Chief Controller R&D, DRDO New Delhi; Former Vice-Chancellor, DIAT (DU), Pune

### Other Awards

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

|    |   |
|----|---|
| 1. | Dr. Baldev Raj, Director National Institute of Advanced Studies, (NIAS), Bangalore was conferred the Eminent Engineer Award of Engineering Council of India (ECI) in recognition of his outstanding research contributions in the area of Nuclear Engineering. The award was given during the 12th Foundation Day & Eminent Engineer Award Function of Engineering Council of India held on April 4, 2014 at New Delhi. |
| 2. | Mr NR Narayana Murthy, FNAE, Chairman Emeritus, Infosys Ltd., Bangalore was conferred the Eminent Engineer Award of ECI in recognition of his significant contributions to the software industry in the country. The award was given during the 12th Foundation Day & Eminent Engineer Award Function of Engineering Council of India held on April 4, 2014 at New Delhi.   |
| 3. | Dr. K. Kasturirangan, Chairman of Karnataka Knowledge Commission and Past-President, INAE has been conferred with the Rajyotsava awards for the year 2014 in the field of Science /Technology by Government of Karnataka on Nov 1, 2014.  |
| 4. | Dr. BN Suresh, Vikram Sarabhai Distinguished Professor and Vice-President, INAE has been conferred with the Rajyotsava awards for the year 2014 in the field of Science /Technology by Government of Karnataka on Nov 1, 2014.  |
| 5. | Dr. TSR Prasada Rao, Chairman, Sarasijam Technologies and Advisor, GTC Technology Inc has been conferred with the Petrotech Lifetime Achievement Award 2014 on January 12, 2014 in recognition of his R&D contributions to India's oil and gas industry. The award was given by the then Hon'ble Prime Minister, Dr. Manmohan Singh.  |
| 6. | Prof. J Nanda, INSA Senior Scientist, Dept of Electrical Engineering, Indian Institute of Technology, New Delhi has received the Glory of India Award by India International Friendship Society on 12th June 2014.  |
| 7. | Prof. Dipankar Banerjee, Professor, Department of Materials Engineering, Indian Institute of Science, Bangalore has been conferred with the Lifetime Achievement Award of the Defence Research & Development Organisation (DRDO).   |



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| 8.  | Prof. JC Misra, Institute of Technical Education and Research, Siksha O Anusandhan University, Bhubaneswar was conferred with the “EET CRS Best Scientist Award-2014” during the Award Ceremony held in Bangalore on June 21, 2014. Prof. Misra also received the ”Shiksha Gaurav Puraskar” awarded by the Centre for Education Growth and Research (CEGR), New Delhi in recognition of his outstanding and exemplary contribution to Education. The award was given by Mr. Arif Mohammed Khan, Former Cabinet Minister during the function held at the India International Centre, New Delhi on July 17, 2014.   |
| 9.  | Prof. MR Madhav, Department of Civil Engineering, J.N. Technical University, College of Engineering, Hyderabad has been selected for conferment of Distinguished Alumnus Award by Indian Institute of Science, Bangalore for the year 2014.   |
| 10. | Prof. V. Ramgopal Rao, Institute Chair Professor, Department of Electrical Engineering, Indian Institute of Technology Bombay, Mumbai has been selected for conferment of NASI - Reliance Industries Platinum Jubilee Award for the year 2014.  |
| 11. | Dr. V Prakash, Distinguished Scientist of CSIR-India and Director Research, Innovation and Development at JSS MVP, JSS Technical Institutions Campus, Mysore has been conferred with Life Time Achievement Award by the President-elect of International Council for Science (ICSU) a United Nations body at the International Union of Food Science and Technology World Congress Ceremony held on 21 August 2014 at Montreal for his contribution in the field of Food Science, Food Technology, Nutritional Biochemistry, Food Biotechnology, Food Safety, Food Security, Nutraceuticals, Ayurceuticals, Bioactives and Food Policy. He is the first Indian to receive this prestigious Award. |
| 12. | Mr. V.B. Patel, President, President, Multi Mantech International Pvt. Ltd., and Former Chairman Central Water Commission has received “Leading Personality Award” at hands of Shri Suresh Prabhu, Union Minister (Railways) on Nov 19, 2014.   |
| 13. | Prof Dipak Mazumdar, Ministry of Steel Chair Professor, IIT Kanpur was chosen to receive the 2014 IIM Distinguished Educator Award. The award carried a citation and a cash prize which was received by Prof Mazumdar during the National Metallurgists day celebration at Pune on Nov 14, 2014.  |
| 14. | Dr. BSK Naidu, Chairman Emeritus, Great Lakes Institute of Energy Management & Research, Gurgaon was conferred with “Best Education-Leadership Award from Asian Customer Engagement Forum (ACEF) on Dec 6, 2014 in a glittering function held at Mumbai.  |
| 15. | Prof. Prem Vrat, Pro-Chancellor, Professor of Eminence and Chief Mentor, ITM University, Gurgaon was conferred with the Life Time Achievement Award at the XVIIIth Annual International Conference of Society of Operations Management (SOM) held at IIT Roorkee.   |
| 16. | Prof. Mahesh C. Tandon, Managing Director, Tandon Consultants New Delhi was conferred the award of Outstanding Concrete Technologist by the Indian Concrete Institute and was also facilitated by the Association of Consulting Civil Engineers for Eminent Engineer and Contribution to the Civil Engineering industry in the year 2014.   |
| 17. | Dr. Hari Ram Sharma former Member (Hydro), Central Electricity Authority and Chairman, Nathpa Jhakri Power Corporation (now SJVNL) has received “Leading Energy Personality Award-2014” at the hands of Hon’ble Shri Suresh Prabhu, Union Minister of Railways.   |



## News of Fellows

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|-----|---|
| 1.  | Prof. KL Chopra, Former Director, IIT Kharagpur and Formerly IREDA Chair Professor, Centre for Energy Studies and Thin film Laboratory, Physics Department, IIT, New Delhi has been conferred with Honorary D.Sc by Shiksha O Anusandhan (SOA) University , Bhubaneswar on April 19, 2014.  |
| 2.  | Mr. Avinash Chander, Scientific Adviser to Raksha Mantri, Secretary, Department of Defence R&D and Director General, DRDO was conferred Doctorate of Science, Honoris Causa by Jawaharlal Nehru Technological University (JNTU), Anantapur at its Fifth Convocation   |
| 3.  | Dr. Ahindra Ghosh, Formerly Professor, Department of Materials & Metallurgical Engineering, Indian Institute of Technology Kanpur has published a text book of Metallurgical Kinetics released by PHI Learning Pvt. Ltd., New Delhi.  |
| 4.  | Prof. Prem Vrat, Formerly Vice-Chancellor, ITM University, Gurgaon has assumed the charge of Pro-Chancellor, Professor of Eminence and Chief Mentor of ITM University, Gurgaon. Prof. Prem Vrat has published a book entitled “Materials Management: An Integrated Systems Approach” by Springer under its Text Book Series and has been launched both in e-book form as well as Hard Bound form worldwide.   |
| 5.  | Dr Purnendu Ghosh’s book Neural Suitcase Tells the Tales of Many Minds was published by Partridge Publishing, a Penguin Random House Company. The book offers intriguing and entertaining tales about the human mind, its perfect diversity and fascinating complexity, and the conundrums that reside in every corner of the psyche. Dr Purnendu Ghosh also delivered a key note address on “Transition from fossil fuels to biofuels” at the Indo-US Conference on Advanced Lignocellulosic Biofuels during November 10-11, 2014 at CSIR-IICT, Hyderabad. |
| 6.  | Prof. Santosh Kapuria, Department of Applied Mechanics, Indian Institute of Technology Delhi, New Delhi has been elected as Fellow of Indian National Science Academy (INSA) w.e.f. Jan 1, 2015.  |
| 7.  | Dr. PA Lakshminarayanan, Chief Technical Officer, Simpson and Co. Ltd., Chennai has published a book on “Critical component wear in Heavy duty engines” by John Wiley which appeared under ‘Top selling’ books under Machinery category.  |
| 8.  | Ms Alpa Sheth, Managing Director, VMS Consultants Pvt. Ltd., Mumbai has jointly published an article on “Building Collapses”, which emerged as part of INAE Distinguished Visiting Professorship at IIT Madras. The article can be viewed at link : <a href="http://www.thehindubusinessline.com/opinion/complete-collapse-of-building-standards/article6473308.ece">http://www.thehindubusinessline.com/opinion/complete-collapse-of-building-standards/article6473308.ece</a>   |
| 9.  | Prof. Jamal Mohamed Deen, ECE Department, McMaster University, Hamilton Ontario, Canada has been elected as the next President of The Academy of Science of the Royal Society of Canada.  |
| 10. | Prof. Sukumar Mishra, Department of Electrical Engineering, Indian Institute of Technology Delhi has become Fellow of NASI w.e.f. 2014.   |
| 11. | Dr. Rajeev Shorey, Senior Consultant, TCS Innovation Labs., India/USA, Tata Consultancy Services Ltd., Bangalore has been honoured as “Distinguished Scientist” by the Council of Association for Computing Machinery, New York, USA.   |





|     |  |
|-----|--|
| 12. | Prof. MR Madhav, Professor Emeritus and Visiting Professor, IIT Hyderabad has become the President of IALT for the years 2014-18.  |
| 13. | Prof. Ajit K Chattopadhyay, Dept. of Electrical Engineering, Indian Institute of Engineering Sciences and Technology, Shibpur delivered the Keynote address on “Power Electronics and Green Energy: Advances and Trends” at the National Workshop on Power Electronics (NWPE-2014) held at the Birla Institute of Technology, Mesra, Ranchi, under the Aegis of Deity, NaMPET Phase II, Govt. of India during 7-8 November, 2014.”   |
| 14. | Prof A. Sridharan, formerly Professor of Dept. of Civil Engineering and Deputy Director, Indian Institute of Science, Bangalore has delivered the International IGS Ferroco Terzaghi Oration, the highest award of the society. Prof Sridharan is the second Indian to deliver the lecture on “Soil Clay Mineralogy and Physico-Chemical Mechanisms Governing the Fine - grained Soil Behaviour” on 11th October, 2014.  |
| 15. | Dr. SK Gupta, INAE Distinguished Professor, Central Soil Salinity Research Institute (C.S.S.R.I.), Karnal has become Fellow of the Indian Society of Soil Salinity and Water Quality.  |
| 16. | A text book titled “ A first course in Iron and Steelmaking “ authored by Professor Dipak Mazumdar, Ministry of Steel Chair Professor at IIT Kanpur was released during NMD-ATM held at the College of Engineering, Pune on the Nov 14 , 2014. The book, sixth in the IIM-Universities Press series in “Metallurgy and Materials Science” has been developed to serve as a standard text in Indian Institutes /Colleges/Universities.  |
| 17. | Prof. Mahesh C. Tandon, Managing Director, Tandon Consultants New Delhi was elected President of Indian Association of Structural Engineers for the term 2015-2017. He is also currently President of Indian Society of Wind Engineering (2014-2016).  |
| 18. | An original Technical Paper, ‘Strain rate sensitivity of bulk multi-phase nanocrystalline Al-W-based alloy’, by V. Sreedevi, P.V.S.L. Narayana, Muvva D. Prasad, D. Chakravarty, Koteswararao V. Rajulapati & K. Bhanu Sankara Rao has been awarded third place in the competition for the James Clerk Maxwell Writers Prize for 2014. The paper was published in Philosophical Magazine and Philosophical Magazine Letters. The paper is now available as free access at <a href="http://bit.ly/bY19Z7">http://bit.ly/bY19Z7</a> . Prof. K. Bhanu Sankara Rao, FNAE, Ministry of Steel Chair Professor at Mahatma Gandhi Institute of Technology, Hyderabad and Dr. KV Rajulapati, Young Associate of INAE, Assistant Professor, School of Engineering Sciences and Technology, University of Hyderabad are the co-authors of the paper and jointly guided Mrs. S. Varam for her Ph.D thesis and PVSL Narayana for his M.Tech thesis. |
| 19. | Prof M Jagadesh Kumar, NXP (Philips) Chair Professor, Department of Electrical Engineering, Indian Institute of Technology Delhi has been appointed by the Central Government as a part-time member of the Telecom Regulatory Authority of India for a period of three years.  |
| 20. | Dr. Surendra Pal, Professor Satish Dhawan Professor & Senior Advisor, Satellite Navigation, ISRO Satellite Centre, Bangalore has taken over as Vice Chancellor, Defence Institute of Advanced Technology (DIAT), Pune on 3rd February 2015.  |





### **Fellows Deceased in Last one Year**

The Council learned with deep regret regarding the demise of the following Fellows during the period April 1, 2014 to March 31, 2015.

1. Dr. Amit Chatterjee, Formerly Advisor to MD, Tata Steel, Jamshedpur.
2. Mr. N Srinivasan, Formerly Member, Atomic Energy Commission, Mumbai.
3. Mr. RH Mody, Formerly Managing Director, TISCO, Jamshedpur.
4. Prof. N Ganesan, Department of Applied Mechanics, Indian Institute of Technology Madras.
5. Mr. KN Shenoy, Formerly Chairman, Asea Brown Boveri Ltd., Bangalore.
6. Dr. VR Gowariker, Chief Director, Bio-hydrocarbon Via Space Crude Project, ISRO and Formerly Vice-Chancellor, University of Pune.



## INAE Annual Convention

The Annual Convention of the Indian National Academy of Engineering was held on Dec 12-13, 2014 at Birla Institute of Scientific Research (BISR), Jaipur. The major scientific and engineering highlights of the Convention were as under:

### ***Presentations by newly elected Fellows and Young Engineers on 12th and 13th Dec 2014***

- ❖ Dr. J Narayana Das : Fuel Cell Technologies-DRDO Initiatives
- ❖ Dr. G Madhusudhan Reddy : Welding Aspects of Advanced Metallic Materials
- ❖ Dr. Ujjwal Maulik : Multi-objective Optimization : Recent Trends and Challenges
- ❖ Dr. Debasis Chakraborty : Development and Applications of CFD Software for Aerodynamic and Propulsion Design of Missile
- ❖ Prof. T Pradeep : Affordable point-of-use Drinking Water Purification using Nanomaterials
- ❖ Dr. S Arunachalam : Wind Loads on Buildings and Structures – R&D Contributions
- ❖ Prof. Rudra Pratap : Understanding and Exploiting Extremely Small Scale Mechanical Oscillations
- ❖ Dr. A. Seshagiri Rao : Enhanced Control of Chemical and Biological Processes
- ❖ Dr. Shaikh Faruque Ali : Vibration Based Micro Power Generators
- ❖ Mr. Pradeep Chaturvedi : Engineering Innovation for Sustainable Future
- ❖ Dr. Raghu Krishnapuram : Robust Approaches to Analytics on Uncertain Data
- ❖ Mr. N Saibaba : Microstructural Evolution of Zr-2.5% Nb Pressure Tube During Thermo Mechanical Processing
- ❖ Dr. Ajit V Sapre : Innovations in Hydrocarbon Business - Molecules to Markets: One Perspective
- ❖ Prof. Girdhar Madras : Ionic catalysts for methane reforming
- ❖ Dr. Anirban Mukhopadhyay : Algorithms for Mining Protein-Protein Interaction Networks
- ❖ Dr. Abhijit Chatterjee : Materials Informatics for Energy Applications
- ❖ Prof. NP Padhy : New Algorithms for Modern Transmission and Smart Distribution Systems
- ❖ Dr. T Venugopalan : Wastage Utilization Technologies
- ❖ Dr. Prabhat Kumar : Technological ambitions to reality
- ❖ Prof. P V Kumar : Error Correcting Codes for Big Data
- ❖ Mr. A Ravisankar : Development of Hot Cell Systems and Remote Handling equipments – A Challenge in Fast Reactor Fuel Reprocessing Technology



- ❖ Dr. Venkata N Padmanabhan : Tracking Users Indoors: From Localization to Physical Analytics
- ❖ Dr. Kushal K Shah : Plasma heating due to electromagnetic fields
- ❖ Dr. Rajnesh Bhardwaj : Evaporation of Droplets Laden with Colloidal Particles : A Review
- ❖ Mr. Rohit Shukla : Compact Pulsed Power Driven Plasma Devices for Radiation Application & Diagnostic Development in the Relevant Field
- ❖ Dr. Sabha Raj Arya : Adaptive Control Algorithms for DSTATCOM
- ❖ Mr. Sarma Gunturi : Estimation and Correction of Temporally Varying Frequency Offset in WLAN Receiver
- ❖ Dr. Anoop Kumar Shukla : Indigenization of Critical Materials and Processing Technologies for Indian Space Programme

#### *Award Function on 12<sup>th</sup> Dec, 2014*

The Grand Award Ceremony was held on the evening of December 12, 2014. The INAE Young Engineer Awards and the Innovative Students Projects Awards were conferred during the Award Ceremony.



*Dignitaries on the dais during Annual Convention*



*Dr Sandip Chakraborty receiving Innovative Student Projects Award from Dr Baldev Raj, President, INAE*



*Dr. Anirban Mukhopadhyay receiving INAE Young Engineer Award from Dr Baldev Raj, President, INAE*

Prof. Pradip Dutta, Department of Mechanical Engineering, Indian Institute of Science, Bangalore and Prof. Bhargab B Bhattacharyya, Advanced Computing and Microelectronics Unit, Indian Statistical Institute, Kolkata were conferred the INAE Outstanding Teachers Award 2014. Prof Pradip Dutta was awarded in recognition of his outstanding contributions to Energy Systems and Advanced Thermal Technologies whereas Prof Bhargab B Bhattacharyya was conferred the award in recognition of his significant contributions to Computer Science and Engineering and Microfluidics





*Prof. Pradip Dutta receiving Outstanding Teachers Award from Dr Baldev Raj, President, INAE*

Dr. Avinash Chander, Scientific Advisor to Raksha Mantri (SA to RM), Secretary, Defence Research & Development and Director General, Defence Research & Development Organization (DRDO), Ministry of Defence, New Delhi was conferred the Prof. Jai Krishna Memorial Award 2014 in recognition of his outstanding and pioneering research contributions in the area of Navigation and Guidance Systems and Critical Defence Technologies. Prof. RK Shyamasundar, Senior Professor & JC Bose National Fellow, Tata Institute of Fundamental Research, Mumbai was conferred the Prof. SN Mitra Memorial Award 2014 in recognition of his significant contributions in the areas of Formal Modelling and Methods for Complex Software Systems.



*Dr. Avinash Chander receiving Prof. Jai Krishna Memorial Award 2014 from Dr Baldev Raj, President, INAE*



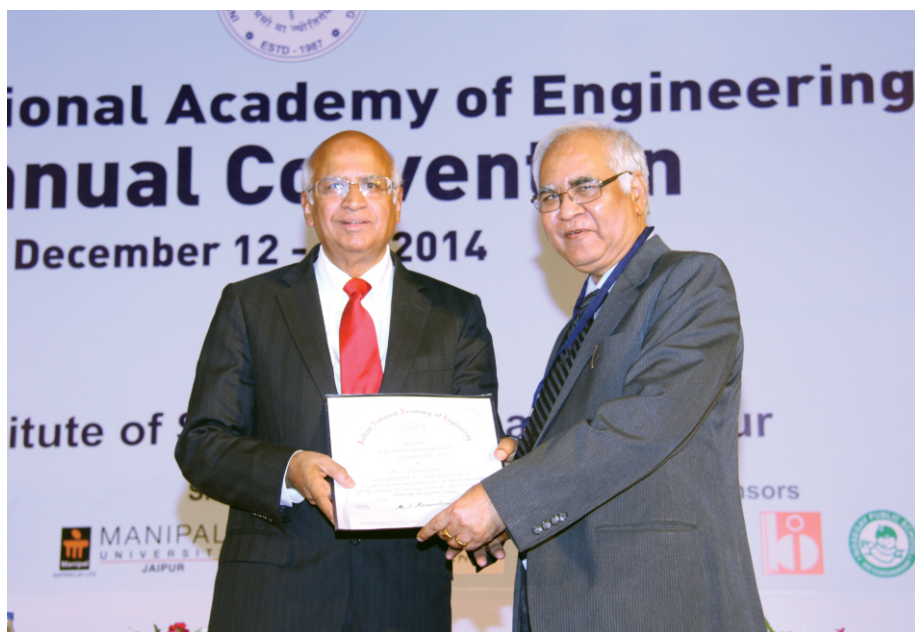


*Prof. RK Shyamasundar receiving Prof. SN Mitra Memorial Award 2014 from Dr Baldev Raj, President, INAE*

Prof. S Ranganathan, NASI Senior Scientist Platinum Jubilee Fellow, Indian Institute of Science, Bangalore and Mr. S Ramadorai, Vice-Chairman, Tata Consultancy Services, Mumbai were conferred Life Time Contribution Awards in Engineering 2014. Prof S Ranganathan was conferred the award in recognition of his outstanding contributions in the fields of Metallurgy, Quasicrystals, Bulk Metallic Glasses and nano structured metals whereas Mr. S Ramadorai was awarded in recognition of his outstanding contributions to his leadership role in Information Technology Industry. Life Time Contribution Award lectures were delivered by Prof. S Ranganathan and Mr. S Ramadorai. Outstanding Teachers Award lecture was delivered earlier in the day by Prof. Pradip Dutta. Prof Jai Krishna and Prof. SN Mitra Memorial lectures were delivered by Dr. Avinash Chander and Prof. RK Shyamasundar respectively.



*Prof. S Ranganathan receiving the Life Time Contribution Award 2014 from Dr Baldev Raj, President, INAE*



*Mr. S Ramadorai receiving the Life Time Contribution Award 2014 from Dr Baldev Raj, President, INAE*

#### ***Annual General Meeting of Fellows on 13<sup>th</sup> Dec, 2014***

The 26<sup>th</sup> Annual General Meeting of Fellows was held on Dec 13, 2014. During the Induction Ceremony, the following twenty five Fellows/Foreign Fellows were formally admitted into the Academy by the President, INAE and signed the Admission Register.

Dr. S Arunachalam, Dr. Raghu Krishnapuram, Prof. Ujjwal Maulik, Prof. S Sudarshan, Prof. Rudra Pratap, Mr. A Ravisankar, Prof. Giridhar Madras, Mr. Ajit V Sapre, Mr. R Subbayan, Prof. NP Padhy, Dr. Venkata N Padmanabhan, Prof. PV Kumar, Mr. S Varadarajan, Mr. Chandrakant Pithawa, Prof. Shanthi Pavan, Dr. G Madhusudhan Reddy, Dr. T Venugopalan, Mr. M Narayana Rao, Mr. Pradeep Chaturvedi, Dr. Prabhat Kumar, Mr. N Saibaba, Mr. AV Parab, Dr. J Narayana Das, Prof. T Pradeep and Prof. Manoj Kumar Tiwari.

Subsequently, a Brainstorming Session of INAE Fellows was held. A number of ideas and suggestions received wherein the Academy can make a difference and bring about a paradigm change in domains of national importance.



## Digital Knowledge Resource Centre

INAE Digital Knowledge Resource Centre (DKRC) has been set up during 2014 at INAE Office, Vishwakarma Bhawan, New Delhi, where the following facilities are proposed to be created:

- Access to e-journals from reputed foreign publishers (IEEE, Oxford University Press, Royal Society of Chemistry (RSC), Taylor & Francis (T&F), Wiley, Web of Science (WoS), etc.), through Department of Science and Technology-National Institute of Science Communication and Information Resources (DST-NISCAIR) e-consortium.
- Provide online access to e-journals mentioned above to Fellows of INAE.
- Creating a repository of Research work / Engineering contributions and bibliographic details including abstracts of scholarly and professional publications of individual INAE Fellows so that the same can be made available to other Fellows of INAE.
- Provide online access to the above mentioned information/material to Fellows of INAE.
- Access to reports/material of Indian and foreign publications pertaining to issues of national importance viz. Energy, Water and Environment Management, Healthcare Technologies, Mobility & Transportation, Manufacturing and Information Technology.

With our vigorous efforts during the last few months, e-access to the journals of eminent foreign publishers IEEE, Royal Society of Chemistry, Wiley Blackwell and Web of Science is already available at INAE Office using the static IP of INAE.

### Remote Access Facility

In order to provide remote access facility to INAE Fellows located in different parts of the country, 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 user id and pass word to each INAE Fellow has been assigned and intimated to each INAE Fellow.

Certain restrictions have been imposed by the publishers on download of papers and as such it is imperative to exercise an effective control on the aspect of download through remote access. Hence it has been decided that any Fellow desirous of downloading particular material/text/information would send an appropriate request through e-mail to INAE Office who in turn will download the same and forward to the concerned Fellow through e-mail. This procedure for downloading will ensure a proper and effective control on the material/information/text being downloaded.

Based on specific requirement from Fellows, copies of the desired papers from various Foreign publishers have been downloaded at DKRC and sent to them through email.

As per the feedback received from a large number of Fellows, the above facility has been functioning quite well and they have expressed appreciation of this facility.



## **Establishment of Repository at DKRC**

During the next phase, using the server already installed at DKRC, it is proposed to establish a repository of the details of Research work / Engineering contributions and bibliographic details including abstracts of scholarly and professional publications of individual INAE Fellows. For this purpose, the relevant details will be obtained by us from individual INAE Fellows through a pre-designed format and a Databank of digitized research work of INAE Fellows will be created so that this can be shared through the repository at DKRC.





## Publications of the Academy

### **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.

### **Report of the Forum on Technology Foresight and Management Forum for addressing National Challenges**

INAE constituted a “Technology Foresight and Management Forum” in Aug 2012, with Shri VK Agarwal, Formerly Chairman, Railway Board & Ex-officio Principal Secretary, Govt. of India as Chairman, besides INAE Fellows and experts, with the mandate of preparing a roadmap for addressing National Challenges.

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.

It is a well known fact that “Technology Foresight” is regarded as the most upstream element of the technology development process. It provides inputs to the formulation of technology policies and strategies that guide the development of the technological infrastructure. In addition, technology foresight provides support to innovation, leading to enhanced competitiveness and inclusive growth. Technology foresight helps the engineers, scientists, industrialists, government officials and other strategists in the society; to identify the areas of strategic research and the emerging technologies likely to yield the greatest economic and social benefits.





The Forum has brought out three challenges/areas in the first Report being compiled 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 suggestions/recommendations of the Forum highlighted in the report are considered to be of value to the Nation and all policy-makers, engineers, technocrats and administrators in addressing the national challenges. 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 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 have also been covered.

## 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

### **Institution of INAE Satish Dhawan Chair of Engineering Eminence**

INAE Satish Dhawan Chair of Engineering Eminence has been instituted in January 2015. Dr. Anil Kakodkar, DAE Homi Bhabha Chair, Bhabha Atomic Research Centre (BARC), Mumbai and Dr. K Kasturirangan, Professor Emeritus, National Institute of Advanced Studies (NIAS), Bangalore have accepted to hold the subject Chair w.e.f. January 2015. Dr. Anil Kakodkar has intimated that he would be working on the topic “Sustainable model for technology enabled development in rural areas” and Dr. K Kasturirangan would work on the topic - “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”.

### **MOU between INAE and CII**

An MOU between INAE and CII was signed on Nov 21, 2014 during the 4th AICTE-CII Global University-Industry Congress held at Greater Noida.

The main objectives of the MOU are:

- Organisation of high-level interactions between research organizations, government and industry to prepare a road-map for future technologies, breakthrough innovations and adoption of suitable technology for Indian companies.
- Participation of members from both sides in conferences, summits, workshops, symposiums, interactive meetings, round-tables.
- Outreach efforts, wherever required, by both parties.

### **Constitution of the Consultative Committee between INAE and DST**

The Consultative Committee comprising of three members each from DST and INAE has been constituted which would meet every quarter. The Committee would deliberate on various issues of mutual interest and identify the themes, research areas and engineering issues which are relevant to the Country's needs. INAE would pursue appropriate studies on such identified topics and come out with the recommendations which could be taken up with the relevant Departments.

### **INAE Letters**

It is proposed to start a new journal of INAE which the Editorial Committee has named as “INAE letters”. During the meeting of the Committee for “Research Journal – INAE Letters” held on Feb 13, 2015 at INAE Office, Gurgaon a Committee comprising of Prof. SC Dutta Roy, Dr. Purnendu Ghosh, Prof. Sanjay Mittal, Prof. Jagadesh Kumar of IIT Delhi and Brig Rajan Minocha was constituted to interact with the reputed Publishers and shortlisting a suitable Publisher for this task. Subsequent to the meeting, a meeting Chaired by Dr Purnendu Ghosh and attended by Prof SC Dutta Roy & Brig Rajan



Minocha with representatives from three publishers shortlisted by the Committee viz. Taylor & Francis, Elsevier and Springer was held at INAE Office on March 23, 2015. Based on the discussions, all three publishers were requested to forward a brief proposal containing relevant details including finances and timelines pertaining to undertaking the task of publishing the research journal “INAE Letters” . Ms/ Springer have since forwarded a proposal for consideration by INAE Editorial Committee.



# Statement of Accounts

## 2014-15



*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, 2015 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, 2015; and
  - b) In the case of Income and Expenditure Account, of the deficit of Income over Expenditure of the Academy for the year ended on March 31, 2015.

PLACE: NEW DELHI  
DATED: July 02, 2015

For MEHRA MALHOTRA & CO  
CHARTERED ACCOUNTANTS

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



## BALANCE SHEET AS AT 31ST MARCH, 2015

(Amt in Rs)

|   | As at<br>31.3.2015  | As at<br>31.3.2014  |
|---|---------------------|---------------------|
| <b><u>CORPUS/CAPITAL FUND AND LIABILITIES</u></b> |                     |                     |
| GENERAL FUND                                      | 9,15,93,266         | 8,56,96,381         |
| EARMARKED FUNDS                                   | 1,42,19,717         | 1,30,80,317         |
| CURRENT LIABILITIES AND PROVISIONS                | 69,82,160           | 1,37,97,856         |
| <b>TOTAL</b>                                      | <b>11,27,95,143</b> | <b>11,25,74,554</b> |
| <b><u>ASSETS</u></b>                              |                     |                     |
| FIXED ASSETS                                      | 4,38,07,710         | 4,72,12,326         |
| INVESTMENTS                                       | 5,82,57,086         | 5,95,95,959         |
| CURRENT ASSETS, LOANS & ADVANCES                  | 1,07,30,347         | 57,66,269           |
| <b>TOTAL</b>                                      | <b>11,27,95,143</b> | <b>11,25,74,554</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 : July 02, 2015



## **INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2015**

(Amt in Rs)

|   | Current Year<br>2014-15 | Previous Year<br>2013-14 |
|---|-------------------------|--------------------------|
| <b>INCOME</b>   |                         |                          |
| Grants and Sponsorships                                       | 4,92,01,295             | 4,63,14,149              |
| Delegate Registration Fees etc.                               | 7,00,440                | 9,48,451                 |
| Transfer From General Fund                                    | 8,46,552                | 0                        |
| <b>TOTAL</b>  | <b>5,07,48,287</b>      | <b>4,72,62,600</b>       |
| <b>EXPENDITURE</b>  |                         |                          |
| (1) Engineering Activities                                    |                         |                          |
| i) Seminars / Conferences / Symposiums / Workshops            | 44,47,644               | 56,72,602                |
| ii) INAE Chair , Distinguished Professors & Mentoring Schemes | 66,32,746               | 69,79,432                |
| iii) Research Studies/ Projects                               | 21,89,286               | 34,95,653                |
| iv) INAE Awards   | 34,37,017               | 37,10,411                |
| v) Academia-Industry Interaction                              | 14,35,238               | 16,75,229                |
| vi) INAE Forums   | 2,27,098                | 3,61,967                 |
| vii) Academy Meetings   | 25,36,912               | 24,99,619                |
| viii) Annual Convention                                       | 33,82,365               | 10,40,219                |
| ix) International Affairs                                     | 31,87,619               | 17,32,076                |
| x) INAE Publications  | 11,40,132               | 11,83,697                |
| xi) Financial Assistance for Engineering Activities           | 6,00,000                | 10,22,500                |
| xii) CAETS 2015 Global Event                                  | 9,52,673                | 0                        |
| (2) Establishment expenses                                    | 1,49,61,725             | 1,28,59,955              |
| (3) Depreciation  | 55,53,369               | 49,88,747                |
| (4) Disposal of Assets  | 64,463                  | 8,817                    |
| (5) Transfer to General Fund                                  | 0                       | 31,676                   |
| <b>TOTAL</b>  | <b>5,07,48,287</b>      | <b>4,72,62,600</b>       |

As per our report of even date

For MEHRA MALHOTRA & CO  
CHARTERED ACCOUNTANTS

Sd/-  
(ARUN KUMAR MEHRA)  
Partner  
(Membership No. 80827)  
(Reg. No. : 001052N)  
Place : New Delhi  
Dated : July 02, 2015

On behalf of the Council:

Sd/-  
(Dr BN Suresh)  
President

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

Sd/-  
(Brigadier Rajan Minocha)  
Executive Director

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

## **INAE OFFICE and DKRC**

### **INAE Office**

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### **INAE Digital Knowledge Resource Centre (DKRC), New Delhi**

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Indian National Academy of Engineering