



Annual Report 2016 - 17



Indian National Academy
of Engineering

FOREWORD

ABOUT THE ACADEMY

INAE GOVERNING COUNCIL FOR THE YEAR 2017

INAE COMMITTEES

NEW INITIATIVES DURING THE YEAR

ACADEMY ACTIVITIES

INTERNATIONAL AFFAIRS

THE FELLOWSHIP

INAE ANNUAL CONVENTION

DIGITAL KNOWLEDGE RESOURCE CENTRE

PUBLICATIONS OF THE ACADEMY

STATEMENT OF ACCOUNTS 2016-17



Annual Report 2016 - 17



Indian National Academy
of Engineering



Foreword

I am very delighted to extend my warm greetings to all our esteemed Fellows, Foreign Fellows and Young Associates and express my sincere gratitude to each one of you for your dedicated contributions and commitment to the activities of the Academy. Year 2016, has indeed been a very eventful year for INAE in every domain of its activities, be it outreach, be it fulfilling important milestones or be it on the generation of engineering inputs/interventions to address issues of engineering relevance to the country. We could accomplish all these tasks efficiently, solely due to the significant contributions made by our distinguished Fellows, Foreign Fellows and Young Associates. On behalf of the Academy I express my deepest appreciation to all of you and keenly look forward to have your active participation in all our forthcoming activities.

It gives me great pleasure to give you an account of some of the important activities carried out by INAE which are in consonance with the thrust areas of the Government. Department of Science and Technology (DST) requested INAE to organise a comprehensive review on Clean Coal technologies in the country, addressing the current status of technologies, the gaps and the thrust areas of research which need funding. In response, INAE and DST jointly organised two Round Table meetings on **“Clean Coal Technologies in India: Current Status, Demands and Aspirations – Pathways to Achievements”** in June and October 2016 at New Delhi. It also brought out a comprehensive report highlighting the specific areas, gaps, actions needed to bridge the gaps and identification of research areas which require funding. A total of 11 such proposals were finalised and submitted to DST which are being considered for funding from DST. The entire effort on Clean Coal technologies reached its logical conclusion and was deeply appreciated by DST.

The new civil aviation policy, announced recently by the Govt of India has the central objective of promoting the development of regional connectivity. With this new policy the requirement of Regional Civil Aircraft would be substantially higher in the coming years. To meet such demands there is a strong need to build a sound base for the realisation and production of a Civil Transport Aircraft industry in the country. To address this vital issue, INAE in association with National Institute of Advanced Studies (NIAS), Bangalore organized a round table meeting with all concerned stakeholders including the industries in June 2016. The recommendations of this meeting are being pursued with the right agencies in Government of India.

Keeping in mind the national goals, INAE undertook a research study on **“Engineering Interventions Necessary for Achieving 175 GW of Renewable Power by 2022”**. The study addresses the vital issues, such as bridging the gap of ‘what is perceived as achievable’ and ‘what India must achieve’ and recommends appropriate engineering interventions to achieve the targets. The Study report was released by Mr. Piyush Goyal, the Hon’ble Minister of State with Independent Charge for Power, Coal, New and Renewable Energy and Mines during a Workshop on “Energy Transitions: The Global Challenges and Opportunities” held at New Delhi in February 2017.

Two major joint international events were held this year with CAETS Member Academies. One, with Australian Academy of Technological Sciences and Engineering (ATSE) on **“Sustainable Urban Water Management”** was held in March 2017 at Jodhpur, essentially addressing various issues related to the delivery and management of urban water services in cities. A Position Paper on sustainable water management, towards making water a sustainable resource has been prepared. Second, with National Academy of Engineering of Korea on “High Temperature Materials” was held during March 2017 at Bangalore. The workshop covered Themes on High Temperature Materials



used in several critical applications like aircraft, rocketry, nuclear energy, thermal plants, re-entry vehicles, chemical processing plants etc. A white paper covering the actionable recommendations for further follow-up by the two Academies is prepared.

The Engineers Conclave for the year 2016 was held at Indian Institute of Technology (IIT) Madras during September 2016 with themes on **“Engineering Education 2020”** and **“Smart Cities”**. Chief Guest was Shri M Venkaiah Naidu, Hon’ble Minister for Urban Development, Housing & Urban Poverty Alleviation and Information & Broadcasting and the first issue of the Research Journal “INAE Letters” was also released. The recommendations of the Engineers Conclave 2016 are being progressed with the concerned Ministries/ Departments.

It is proposed to initiate an INAE Youth Forum this year with the main objective of engaging the Indian youth in engineering activities at national level. As a first step, an Online National Essay Competition for the 4th year engineering students from B.Tech/ BE /BSc (Tech)/ Integrated MTech/ ME from all MHRD/AICTE approved institutions and universities has already been launched. The topic chosen for the year 2017 is “Towards Technological Self-Reliance and Leadership” and the essays are under evaluation. As a novel initiative, the INAE Youth Conclave is planned to be held at Jaipur on Aug 11-12, 2017 with an idea of providing a platform for close interaction between the youth and our Fellows. The awards will be distributed during the Youth Conclave.

INAE actively participated in the programme on “Technology Upgradation of Select Engineering Goods” held at New Delhi in June 2016 under the Chairmanship of Dr R Chidambaram, Principal Scientific Advisor to the Govt. of India. Subsequently the Department of Commerce convened a brainstorming meeting chaired by Shri Ravi Capoor, Joint Secretary, Department of Commerce, in July 2016 to seek vital inputs for technology upgradation in the engineering sector with a view of gaining a better share of the global market. As an outcome of the deliberations, experts from INAE participated in the technology meets held to discuss specific issues on “Industrial Valves” and “Electric Motors” in July and August 2016 respectively. The inputs from the INAE experts were well received by the organizers of the meeting.

I am very happy to report that DST and INAE have been jointly working towards, setting up of ten Senior Level Fellowships in the field of Engineering akin to JC Bose Fellowship in Science to be named as Abdul Kalam Technology Innovation National Fellowship. The main objective is to recognize, encourage and support the translational research by individuals towards excellency in engineering, innovation and technology development. All areas of Engineering, innovation and technology will be covered by this fellowship.

INAE has been very proactive in energising the Sectional Committees and the Local Chapters with a view of bringing greater involvement of Fellows in the activities of the Academy. I am delighted to state that we have received an overwhelming response by all our Fellows and activities have increased manifold in several areas. We are looking forward for much more enhanced participation in the coming years by all our Fellows.

The Engineers Conclave 2017 is planned at CSIR-NAL, Bangalore during September 2017. The themes of the Conclave are **“Regional Air Connectivity”** and **“Digital Economy”** both of which are very relevant in the present context. The Annual Convention 2017 is being hosted by an Industry, TCS and the event is planned at TCS Centre located at Sipcot IT Park Siruseri, Chennai. The preparations for conduct of the event have been initiated and I look forward for the maximum participation of Fellows in this Annual event.

We always seek the feedback and valuable guidance, for further strengthening the Academy, increasing its outreach and its impact. Hence, we would be very happy to receive your valuable inputs and suggestions to fulfil the goals set for the Academy. I also take this opportunity to wish all our Fellows and Young Associates a grand success in all your future professional pursuits and endeavours.

Dr BN Suresh
President, INAE

Contents

Foreword	1
About the Academy	5
INAE Governing Council for the Year 2017	7
INAE Committees	
• Sectional Committees	9
• Other Committees and Forums	11
New Initiatives during the Year	14
Academy Activities	
• Seminars/Workshops/Conferences – National and International	19
• INAE Study Group on Indian Engineering Heritage (Metallurgy)	36
• Research Studies	38
• Research Schemes	39
• INAE Forums	44
• INAE “Satish Dhawan Chair(s) of Engineering Eminence”	48
• Engineering Excellence Awards	49
• Joint Schemes with AICTE	53
• National Competition on Innovation in Manufacturing Practices – 2017 (IMP-2017)	56
• Events organized by Local Chapters	59



International Affairs

- CAETS 2016 Annual Meeting and Engineering a Better World Conference 64

The Fellowship

- Newly Elected Fellows 66
- Honours and Awards 71
- News of Fellows 74
- Fellows Deceased (in last one year) 77

INAE Annual Convention 78

Digital Knowledge Resource Centre 88

Publications of the Academy 91

Statement of Accounts 2016-17 95

About the Academy

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

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

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

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

INAE Governing Council for the Year 2017



President : Dr. BN Suresh, Honorary Distinguished Professor, ISRO Hqrs., Bangalore



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



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



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



Vice-President
(Finance & Establishment) and **Chief Editor of Publications** : Dr. Purnendu Ghosh, Executive Director, Birla Institute of Scientific Research, Jaipur



Members
Engg Section-I : Ms Alpa Sheth, Managing Director, VMS Consultants Pvt Ltd, Mumbai



Engg Section-II : Mr. K Ananth Krishnan, Chief Technology Officer, Tata Consultancy Services, Chennai.



Engg Section-III : Prof. ML Munjal, INSA Senior Scientist, Department of Mechanical Engineering, Indian Institute of Science, Bangalore.



Engg Section-IV : Mr. DP Misra, Director, Development Consultants Pvt Ltd & Adviser, Jindal Steel and Power Ltd., Mumbai



Engg Section-V : Prof. Sivaji Chakravorti, Director, National Institute of Technology, Calicut.



Engg Section-VI : Dr. Rajeev Shorey, Senior Consultant, TCS Innovation Labs., India/USA, Tata Consultancy Services Ltd., Bangalore.



Engg Section-VII : Dr. G. Satheesh Reddy, Scientific Adviser to Raksha Mantri & Distinguished Scientist, DRDO.



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

	Engg Section-IX	: Mr. MV Kotwal, Former Member of the Board & President-Heavy Engineering, Heavy Engineering Division, Larsen & Toubro Ltd., Mumbai.
	Engg Section-X	: Dr. V Jayaraman, Prof. Satish Dhawan Professor and Sr. Advisor (Space Applications), ISRO Headquarters, Bangalore.
	Ministry of Science & Technology, Department of Science & Technology	: Prof. Sanjay Mittal, Department of Aerospace Engineering, Indian Institute of Technology Kanpur.
	Ministry of Human Resource Development	:
	Department of Space	: Dr. V Narayanan, Deputy Director-Cryogenic Propulsion Engines & Stage Entity & Project Director-C25 Cryogenic Engines Group, Liquid Propulsion Systems Centre, Indian Space Research Organisation, Thiruvananthapuram.
	All India Council for Technical Education	: Prof. RK Shevgaonkar, Department of Electrical Engineering, Indian Institute of Technology Bombay, Mumbai.
	Asiatic Society	: Prof. Arunendu Banerjee, Sadananda Sadan, Kolkata.
	Indian National Science Academy	: Prof. Anurag Sharma, Physics Department, Indian Institute of Technology, Delhi.
	Indian Academy of Sciences	: Prof. Sandeep Sen, Department of Computer Science & Engineering, Indian Institute of Technology, Delhi.
	National Academy of Sciences (India)	: Prof. SP Mehrotra, Professor-in-charge- R&D, and Professor-in-charge External Relations, Indian Institute of Technology Gandhinagar.
	Indian Science Congress Association	: Dr. Er. Nilangshu Bhusan Basu, Principal Chief Engineer (C) & C.M.E. (P & D), The Kolkata Municipal Corporation, Kolkata.
	Institution of Electronics and Telecommunication Engineers (IETE)	: Dr. Shamim Ahmad, Formerly Director, Central Electronics Engineering Research Institute, (CEERI), Pilani; Formerly Vice-Chancellor, Jamia Hamdard,(Hamdard University), New Delhi
	The Institution of Engineers (India)	: Mr. Pradeep Chaturvedi, Vice-President, World Environment Foundation, New Delhi.
	Confederation of Indian Industry (CII)	: Mr. Jibak Dasgupta, Deputy Director, Confederation of Indian Industry (CII), New Delhi.

INAE Committees

Sectional Committees

The composition of the ten Sectional Committees are given below.

Sectional Committee-I

(Civil Engineering)

Convener

Prof. CVR Murty

Members

Dr. SK Kamra

Mr. MM Madan

Prof. Nagesh R Iyer

Mr. VN Heggade

Mr. N Raghavan

Prof. DN Singh

Prof. Santosh Kapuria

Prof. Sriman Kumar Bhattacharyya

Prof. PC Basu

Prof Subrata Chakraborty

Dr. S Arunachalam

Sectional Committee-II

(Computer Engineering and Information Technology)

Convener

Prof. Y Narahari

Members

Dr. Manish Gupta

Dr. Soumen Chakrabarti

Prof. Sushmita Mitra

Prof. Pushpak Bhattacharyya

Prof Dipanwita Roy Chowdhury

Prof Pankaj Jalote

Prof. C Pandu Rangan

Prof. Bhargab B. Bhattacharyya

Mr. PS Dhekne

Dr. Biswadip Mitra

Dr. Raghu Krishnapuram

Sectional Committee-III

(Mechanical Engineering)

Convener

Prof. ML Munjal

Members

Prof. Pradip Dutta

Dr. CP Ramanarayanan

Mr. K Jayarajan

Prof. K Muralidhar

Prof. K Ramesh

Prof. Suman Chakraborty

Dr. Sekhar Majumdar

Dr. R Mahadevan

Prof. BK Dutta

Mr. A Ramchandani

Mr. Anil Kumar Sinha

Sectional Committee-IV

(Chemical Engineering)

Convener

Prof. AB Pandit

Members

Dr. VS Patwardhan

Dr. Ajit V Sapre

Prof. VG Gaikar

Dr. BM Reddy

Dr. NV Choudary

Mr. DP Misra

Dr. Ashish K Lele

Mr. MB Lal

Prof. Giridhar Madras

Prof AK Suresh

Prof. Deepak Kunzru



Sectional Committee-V
(Electrical Engineering)

Convener

Prof. Sivaji Chakravorti

Members

Mr. K Sreekumar
Dr. SN Singh
Prof. G Bhuvaneswari
Prof. AK Pradhan
Prof. NP Padhy
Dr. M Arunachalam
Mr. Manjit Singh
Dr. Sukumar Mishra
Prof. HM Suryawanshi
Mr. RN Nayak
Prof. SV Kulkarni

Sectional Committee-VI
(Electronics & Communication Engineering)

Convener

Prof. V Ramgopal Rao

Members

Dr. KN Sivarajan
Mr. CK Pithawa
Prof. Shibani K Koul
Dr. JN Roy
Prof. Souvik Mahapatra
Dr. SD Sherlekar
Prof. Navakanta Bhat
Prof. Amrutur Bharadwaj
Prof. Amitava Dasgupta
Mr. S Varadarajan
Dr. N Ramamurthy

Sectional Committee – VII
(Aerospace Engineering)

Convener

Dr. AR Upadhyay

Members

Mrs. Tessy Thomas
Dr. V Narayanan
Prof. Debasish Ghose
Dr. UN Sinha
Prof. Sanjay Mittal
Prof. S Suryanarayan
Prof. B Dattaguru
Mr. S Chetty
Mr. VR Katti
Mr. Tapan Misra
Dr. S Gopalakrishnan

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

Convener

Dr. BK Mishra

Members

Dr. U Kamachi Mudali
Prof. Dipak Mazumdar
Mr. HM Nerurkar
Dr. U Ramamurty
Prof. Bikramjit Basu
Dr. GK Dey
Dr. SV Kamat
Dr. Amol A Gokhale
Dr. AK Gupta
Mr. Debashis Deb
Dr. S Tarafder

Sectional Committee-IX
(Energy Engineering)

Convener

Dr. Ajay Mathur

Members

Mr. B Prasada Rao
Prof. Santanu Bandyopadhyay
Mr. N Saibaba
Mr. Pradeep Chaturvedi
Mr. R Natarajan
Dr. Ram Kumar Singh
Prof. C Balaji
Mr. PK Wattal
Dr. J Narayana Das
Mr. MV Kotwal
Dr. Saswati B Roy

Sectional Committee-X
(Interdisciplinary Engineering and Special Fields)

Convener

Prof. MS Ananth

Members

Prof. Manoj Kumar Tiwari
Prof. Prasun K Roy
Dr. S Venkata Mohan
Dr. K Subramanian
Prof. AK Shukla
Prof. P Munshi
Dr. Rajiv Kumar Tayal
Dr. J Raghava Rao
Prof. Rudra Pratap
Mr. M Narayana Rao
Dr. V Jayaraman

Other Committees

Finance Committee

Chairman

Dr. BN Suresh

Members

Dr. Baldev Raj

Dr. KV Raghavan

Prof. Indranil Manna

Dr. Purnendu Ghosh

Dr. Sanak Mishra

Dr. V Adimurthy

Dr. Ajay Mathur

JS&FA, DST

Selection Committee - Life Time Contribution Award in Engineering, Professor Jai Krishna Memorial Award and Professor SN Mitra Memorial Award and Outstanding Teachers Award

Chairman

Dr. BN Suresh

Members

Dr. KV Raghavan

Prof. Indranil Manna

Dr. Purnendu Ghosh

INAE-DST Consultative Committee

Chairman

Dr. BN Suresh

Members from DST

Prof. Ashutosh Sharma

Dr. HK Mittal

Dr. RK Tayal

Dr. Rajiv Sharma

Members from INAE

Prof. Indranil Manna

Prof. V Ramgopal Rao

Dr. Sanak Mishra

Dr. AR Upadhyaya

Steering Committee – Research Schemes/Proposals

Chairman

Dr. KV Raghavan

Members

Prof. Indranil Manna

Dr. Purnendu Ghosh

Prof. Sukumar Mishra

Prof. Nagesh R Iyer

Prof. S Narayanan

Prof. K Bhanu Sankara Rao

Mr. VP Sandlas

Prof. Ashish K Lele

Dr. V Adimurthy

Mr. M Narayana Rao

Dr. Amol A Gokhale

Prof. Joseph Mathew

Prof. Santosh Kapuria

Editorial Committee

Dr. Purnendu Ghosh

Dr. Baldev Raj

Dr KV Raghavan

Prof. Indranil Manna

Dr. Sanak Mishra

Prof. M S Ananth

Prof. Manoj K Tiwari

Brig Rajan Minocha



Selection Committee – Young Engineer and Innovative Student Projects Awards

Chairman

Prof. Indranil Manna

Members

Dr. Purnendu Ghosh

Prof. SK Bhattacharyya

Prof. Santanu Chaudhury

Prof. Anindya Chatterjee

Prof. AB Pandit

Prof. S Narayanan

Dr. M Arunachalam

Dr. Sunita Sarawagi

Mr. VP Sandlas

Prof. Nagesh R Iyer

Prof. K Bhanu Sankara Rao

Prof. BS Murty

Dr. S Tarafder

Prof. Kehar Singh

Prof. G Bhuvaneswari

Dr. AR Upadhyaya

Prof. M. Sharan

Prof. Bikramjit Basu

Prof. Yendluri Shanthi Pavan

FORUM ON TECHNOLOGY FORESIGHT AND MANAGEMENT

Chairman

Mr. VK Agarwal

Members

Prof. Prem Vrat

Dr. YP Anand

Dr. CR Prasad

Mr. Pradeep Chaturvedi

Mr. AK Anand

Mr. KP Singh

Mr. SC Gupta

Mr. VN Mathur

Mr. AK Gupta

FORUM ON ENGG INTERVENTIONS FOR DISASTER MITIGATION

Chairman

Dr. RK Bhandari

Members

Dr. CD Thatte

Prof. Prem Krishna

Prof. DV Singh

Prof. SS Chakraborty

Prof. CVR Murty

Prof. DK Paul

Ms Alpa Sheth

Mr. VK Agarwal

Prof. DN Singh

FORUM ON “INDIAN LANDSCAPE OF ADVANCED STRUCTURAL MATERIALS”

Chairman

Dr. Debashish Bhattacharjee

Joint Conveners

Prof. Amol Gokhale

Dr. GK Dey

Dr. U Kamachi Mudali

Members

Prof. Indranil Manna

Dr. Kamachi Mudali

Dr. GK Dey

Dr. Soumitra Tarafder

Prof. B.S. Murty

Dr. Tim Leverton

Advisors

Dr. Baldev Raj

Dr. Srikumar Banerjee

Dr. Dipankar Banerjee

AICTE-INAE Programmes Committee

Chairman

Dr. Purnendu Ghosh

Members

Prof. Indranil Manna

Prof. S Narayanan

Prof. Nagesh R Iyer

Dr. V Adimurthy

Mr. DP Misra

Prof. BS Murty

Prof. Sukumar Mishra

Prof. Kripa Shanker

Prof. Bhim Singh

Dr. G Malakondaiah

Prof. Dileep N. Malkhede - AICTE

Ms Shalini Sharma – CII

AICTE-INAE DVP Scheme

Dr. Sanak Mishra

Prof. Prem Vrat

Prof. Manoj K Tiwari

AICTE-INAE Teachers Research

Fellowship Scheme

Prof. SN Shome – Rep., CSIR

Dr. BK Dutta – Rep., DAE

Dr. DM Gaitonde – Rep., DAE

Dr. Ashok Kumar – Rep., DRDO

Prof. CRS Kumar – Rep., DRDO

Dr. MS Chandrasekhar – Rep., DOS

Prof. CS Narayanmurthy - Rep., DOS

Brig Rajan Minocha – Convener

Travel Grant Scheme Committee

Convener

Prof. B.S. Murty

Members

Prof. Sachchida Nand Tripathi

Prof. Krishna Moorthy Sivalingam

Prof. Santanu Chaudhury

Prof. Suman Chakraborty

Prof. Giridhar Madras

Prof. Sukumar Mishra

Prof. Y. Shanthi Pavan

Prof. Ranjan Ganguli

Prof. Santanu Bandyopadhyay

Prof. Dileep N. Malkhede - AICTE

Ms Shalini Sharma - CII



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

INAE Annual Youth Forum

An INAE Youth Forum is being instituted with the objective of facilitating the engagement of Indian youth in engineering activities at national level. Dr Purnendu Ghosh, Vice -President, INAE has been chosen to steer all activities related to the creation and operation of the INAE Youth Forum. A White Paper on activities to be undertaken by the Youth Forum is under preparation. As a first step, an Online National Essay Competition for the 4th year engineering students from B.Tech/ BE /BSc (Tech)/ Integrated MTech/ ME from all MHRD/AICTE approved institutions and universities has been launched. Online submission of the essay was open from 15th Feb 2017 to 15th March 2017. The topic chosen for the year 2017 is “Towards Technological Self-Reliance and Leadership” and the essays could be submitted online from Feb 15-Mar 15, 2017 in any of the four sections given below:

- **Section I:** Mechanical Engineering, Manufacturing, Civil Engineering and Management
- **Section II:** Electrical Engineering, Electronics & Telecommunications and Energy
- **Section III:** Bioengineering, Materials Engineering, Chemical Engineering and Mining
- **Section IV:** Computer Science & Engineering and Information Technology

The link for submission <http://essay.inae.in/signup>

The link to the submission webpage has also been provided in INAE website <http://inae.in>.

Prizes

M/s Springer India Ltd. have also joined in to sponsor e-book coupons. The **Online National Essay Competition** will have One **Grand Prize** of **Rs. 1 lakh** and Springer e-book coupons worth **EUR 1000** and three Prizes for each section (**total 4 sections**) as under:

- **First prize** of **Rs. 50,000** and Springer e-book coupons worth **EUR 300** each
- **Second prize** of **Rs. 20,000** and Springer e-book coupons worth **EUR 200** each
- **Third prize** of **Rs. 10,000** and Springer e-book coupons worth **EUR 100** each

The winners will be awarded during the INAE Youth Conclave to be held at Jaipur on **Aug 11-12, 2017**. The awardees will get an opportunity to present their essay during the Youth Conclave.

New process for election of Fellows and selection of Young Engineer Awardees

In order to streamline and strengthen the process for election of Fellows, it was decided to adopt the procedure wherein on receipt of nominations for election to the Fellowship, a meeting of the Sectional Committee would be held to initially shortlist the nominations received for consideration and also identify the domain experts for “Peer Review” of the nominations received. The details of the shortlisted nominations

would then be sent for “Peer Review” to the identified domain experts for reviewing. Thereafter, the second meeting of the Sectional Committee would be held wherein shortlisted nominations along with the “Peer Review Reports” would be deliberated. Based on the deliberations, a list of nominations to be considered for election to the Fellowship would be prepared for deliberation and presentation by the Conveners of the Sectional Committees to the Governing Council during its meeting for election of Fellows.

A similar process is being adopted for shortlisting of nominations for INAE Young Engineer Award wherein a meeting of the Sectional Committee on a date mutually decided by the Conveners would be held to initially shortlist the nominations received for Young Engineer Award along with the nominations for election to INAE Fellowship. The particulars of the shortlisted nominations would be forwarded for “Peer Review” to the four experts, two experts mentioned in the Nomination Form and two additional experts recommended by the members of the Sectional Committees. Thereafter, during the second meeting of the Sectional Committees for recommendation of candidates for consideration by the Council for election to INAE Fellowship; the shortlisted nominations for Young Engineer Award along with the “Peer Review Reports” would also be deliberated. Each Sectional Committee will shortlist a maximum of four candidates, to be called subsequently for making presentations before the Selection Committee.

Constitution of INAE Empowerment Committee

An INAE Empowered Committee has been constituted recently with Dr. PS Goel, Past-President, INAE & Formerly Secretary, Ministry of Earth Sciences and Chairman, Earth Commission as Chairman and Dr. V Adimurthy, Honorary Distinguished Professor, ISRO; Mr. Pradeep Chaturvedi, Vice-President, World Environment Foundation; Mr. SC Chetal, Former Director, IGCAR; Dr. NK Tyagi, Former Director, CSSRI and Prof. B Ravi, IIT Bombay as Members of the Committee. The genesis of this Committee lies in the fact that based on the recent initiatives of INAE to enhance its outreach in the policy domain and also try to align the activities of the Academy with the current thrust areas of the Government of India; there has been good response from all these agencies namely DST, Niti Aayog, Office of PSA, Ministry of Commerce, TIFAC etc and they have been seeking the assistance from INAE in several areas. INAE has also implemented key searchable expert pool which enables to have a quick search of the right experts depending on the problem referred. While receiving the requests from time to time from these multiple agencies there is difficulty in fulfilling the requirements for want of a suitable formal mechanism. Therefore, it was felt that there is a strong need to have a structured mechanism which creates a suitable methodology for interacting with the Fellows and to generate a suitable response for these agencies. Based on interactions with Niti Aayog, some of the immediate areas of concern discussed were Solar Energy; Manufacturing in Electronics Sector; Machine Tool Manufacturing and Manufacturing of Magnets. It is planned to hold meetings to progress areas further by conduct of suitable conferences/workshops.

Reformatting of Programme for Annual Convention and organizing the sideline meetings

This year, the INAE Annual Convention was held at Space Applications Centre (SAC), Ahmedabad on Dec 8-10, 2016 which was preceded by Governing Council meeting on 7th Dec 2016. The format of the INAE Annual Convention had been reorganized to make it more attractive by including the following additional activities besides the normal proceedings held each year.

- (a) Inaugural Session wherein an eminent engineering luminary was invited as the Chief Guest.



- (b) An Industry Session wherein presentations by practicing engineers from the industry to include CEOs of Start-ups had been planned.
- (c) Sideline meetings of the INAE Forums on “Engineering Interventions for Disaster Mitigation” and “Indian Landscape of Advanced Structural Materials”
- (d) Two Plenary talks to include one on an engineering project implemented and other on a general topic of engineering interest.

Collaborative Activity with Ministry of Commerce

INAE was requested to participate in a meeting on “Technology Upgradation of Select Engineering Goods” held at New Delhi on June 15, 2016 under the Chairmanship of Dr R Chidambaram, Principal Scientific Advisor to the Govt. of India. Dr Sanak Mishra, Vice –President, INAE participated in the meeting on behalf of INAE. Subsequent to the meeting the Department of Commerce had convened a brainstorming meeting chaired by Shri Ravi Capoor, Joint Secretary, on July 1, 2016 to progress the various interventions proposed for technology upgradation in the engineering sector with a view to India gaining a better share of the global market based on value added products. As an outcome of the deliberations of the above mentioned meeting, INAE has been requested to suggest the names of experts willing to participate in the next technology meet held on July 29, 2016 at Hubli focussed on Industrial Valves cluster. This project was coordinated by Dr H Purushotham, CMD NRDC and subsequent to the meeting, research project proposals were required to be submitted on specific topics on Industrial Valves, for which funding shall be provided by the Ministry of Heavy Industries. Experts from INAE in the field of “Industrial Valves” participated in the meeting held on July 29, 2016 at Hubli. The contributions made by the experts from INAE was duly appreciated by the Office of the Principal Scientific Adviser to the Government of India.

Based on the positive feedback of this interaction INAE was requested by the office of PSA to nominate suitable experts to participate in the meeting on “Technology Up-Gradation of Electric Motors” with the industry organized by the Department of Commerce organized on Aug 12, 2016 at Bangalore. INAE experts participated in the said meeting chaired by Shri Ravi Capoor, Jt. Secretary, Department of Commerce, Govt. of India. During the meeting a collaborative initiative involving academic institutes and relevant industries was discussed for development of state-of-the-art electric motors with a wide range of applications. The objective was to enable Indian industries to manufacture and export high technology products in areas such as electric motors, sensors & actuators, biomedical devices etc. The inputs from the INAE experts were well received by the organizers of the meeting.

Reaching out to Policy Makers: Interaction with Government Agencies

With the objective of increasing the visibility of INAE in the policy domain, it was decided to align the activities of the Academy with the thrust areas of the Government of India and the Policy Makers; for which necessary inputs would be taken from time to time, from DST, Niti Aayog and other agencies. In this regard, the INAE-DST Consultative Committee.

- **INAE-DST Consultative Committee**

INAE-DST Consultative Committee has been constituted in 2015 with the objective to deliberate on various issues of mutual interest and identify the themes, research areas and engineering issues which are relevant to the Country’s needs. The Committee comprises of Dr. BN Suresh, President,

INAE and Prof. Ashutosh Sharma, Secretary, DST as Co-Chairs with Dr. HK Mittal, Sc. 'G' & Head, NEB, DST; Dr. RK Tayal, Sc. 'G' & Head, IS-STAC, DST as Members from DST and Prof. Indranil Manna, Director, IIT Kanpur; Dr. Sanak Mishra, Former Vice-President, INAE; Dr. AR Upadhyaya, Dr Raja Ramanna DRDO Distinguished Fellow, ADA, DRDO; Prof. V Ramgopal Rao, Director IIT Delhi as Members from INAE. Keeping in view the given mandate of the Committee, following initiatives were undertaken jointly by INAE and DST

- (a) At the behest of DST, INAE recently conducted two Round Table meetings on “Clean Coal Technologies in India: Current Status, Demands and Aspirations – Pathways to Achievements” in June 2016 and Oct 2016 at New Delhi. The objective of the round tables was to examine the current status of clean coal technologies nationally and internationally and identify the areas where research can be initiated to develop the technologies to overcome the gaps. During the second Round Table meeting a total of 11 proposals for R&D projects on clean coal technologies were discussed and submitted to DST. The call for proposals have since been invited by DST.
- (b) Under the Swachh Bharat Mission of Govt. of India, it was solicited to develop technology data bank for municipal solid waste management to enable local bodies take informed decision on technology choices. In pursuance of above endeavour, Ministry of Urban Development (MoUD) and Department of Science & Technology (DST) intend to develop a technology classification to provide guidance to the States regarding selection and use of appropriate technology alternatives for solid waste management. Technology Information, Forecasting & Assessment Council (TIFAC), an autonomous body under DST along with INAE has been entrusted with the responsibility for preparing the data bank on the suitability of the technologies for specific locations and for evolving appropriate parameters to identify the boundary conditions in which a technology would be suitable. In this regard, the readiness level of such technologies and capacity and capability of municipal corporations to use the developed technologies is important. Accordingly, information is being sought from companies / vendors for providing existing technology solutions in the following questionnaire to develop web friendly technology data bank and technology classification based on the identified parameters. A data bank has since been prepared and shall be submitted shortly.
- (c) DST has also appreciated the compilation of INAE Expert Pool which is a Database of INAE fellows with varied areas of specialization. DST emphasized to involve the experts from INAE Expert Pool in various DST Projects Evaluation, Project Monitoring Committees and other Committees of DST.
- (d) INAE and DST have taken an initiative to institute a Senior Level Fellowship in the area of Engineering. The subject Fellowship shall be considered to be named after “Abdul Kalam Engineering Innovation Fellowship”. The guidelines for instituting the subject Fellowship have since been formulated and shall be announced shortly.

- **Creation of data for INAE Expert Pool**

A data bank of the expertise of the INAE Fellows has been created so as make the same available and facilitate the selection of experts in various projects/programmes which are undertaken from time to time. The aim of this expert pool is to provide an easy to access and retrieve search engine, to connect the experts to the individuals or agencies looking for their services.



- **TIFAC-INAE Collaboration**

During one of the meetings of Indian National Academy of Engineering (INAE) and Department of Science and Technology (DST), it was emphasized that INAE may create a dedicated technology group/forum, hold structured discussion, opinion poll, technology survey and seminars/symposia to create technology policy document in collaboration with Technology Information, Forecasting and Assessment Council (TIFAC). This collaboration was suggested to be undertaken on specific engineering and technology challenges/issues as required from time to time. A meeting was held with TIFAC to explore the possibility of collaboration between TIFAC and INAE and it was felt that collaboration between TIFAC and INAE would be very important to complement each other's activities. A six member Working Committee was formed comprising members from TIFAC and INAE. The Committee comprises of Dr. BN Suresh, President, INAE and Prof. Prabhat Ranjan, ED, TIFAC as co-chairs and Mr. Sanjay Singh, Scientist G, TIFAC, Dr. Gautam Goswami, Scientist F, TIFAC, Dr. KV Raghavan, Vice-President, INAE and Brig Rajan Minocha, ED, INAE as the members of the Committee. This committee would focus on specific technological issues of national importance for bringing out action oriented document for further follow up by different stakeholders. A brainstorming Meeting on Global Technology Watch Group Report on Climate change was proposed to be held during June 30 & July 1, 2016 which was postponed and the next date of the meeting is being finalized.

Academy Activities

Seminars/Workshops/Conferences –National

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

Round Table Meeting on “Civil Aircraft Realization and Production in the Country”

The new civil aviation policy, announced recently by the Govt of India has the central objective of promoting the development of regional connectivity. With this new policy the requirement of Regional Civil Aircraft would be substantially higher (estimated at about 250 numbers before the policy initiative, which may now go upto 600) in the coming years and there is a strong need to build a sound base for a Civil Transport Aircraft industry in the country which is totally lacking. The development/production of Civil Aircraft can happen only if a suitable mechanism is established for the management of Civil Aircraft development.

In order to discuss all issues related to this topic, Indian National Academy of Engineering (INAE) in association with National Institute of Advanced Studies (NIAS), Bangalore organized a Round Table Meeting on “Civil Aircraft Realization and Production in the Country” at NIAS, Bangalore on 14th June 2016. The meeting was chaired by an eminent Aerospace Scientist, Prof. R Narsimha, Chairman, Engineering Mechanics Unit, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore. The meeting was well attended by eminent Technologists to include Dr. K Kasturirangan, Former Chairman, ISRO, Former Member, Planning Commission, Dr. AS Kiran Kumar, Chairman ISRO, Dr. BN Suresh, President INAE, Dr. Girish Sahni, DG CSIR, Mr. Suvarna Raju, Chairman, HAL, Dr. PS Goel, Former Secretary, MOES, Dr. Kota Harinarayana, Former PGD, ADA and executives from HAL, NAL, CSIR, ISRO and subject experts from Industries, namely, Tata and Mahendra.

The experts deliberated on the long-felt need to develop indigenous regional transport aircraft in the Country to meet the national requirements. While the nation have recorded remarkable progress in the aerospace sector in the Country, particularly in the areas of fighter aircraft, UAV's, launch vehicle, missiles, spacecraft etc., no commensurate progress in the development of Civil Aircraft have been realized. No doubt the Country has the expertise and the needed capability for the design and development of the Aircraft. Already considerable efforts have been put forth in the design and National Aerospace Laboratory (NAL) has put forth considerable efforts in the design, development and realisation of small civil aircraft. We also have a range of Industries who are capable of realising the system/s meeting the quality standards. The poor progress so far may be attributed to the lack of well defined mechanism for the realisation of such a complex task.

The recommendations emerged from the Round Table meeting along with a paper has been submitted to Dr. Harsh Vardhan, Honourable Minister of Science & Technology for his consideration and also seeking his advice on further actions needed on the subject matter.

10th National Frontiers of Engineering (NatFoE) Symposium

The Tenth National Frontiers of Engineering (NatFoE) Symposium was held on June 23-25, 2016 at Indian Institute of Technology (IIT) Kanpur. Prof Sanjay Mittal, FNAE coordinated the event along with Prof Yogesh Joshi and Prof Kantesh Balani of IIT Kanpur.

Prof. Indranil Manna, Director IIT Kanpur & Vice President, INAE and Prof S.C. Srivastava, President INAE, Kanpur Chapter delivered the Welcome Address. The inaugural talk was delivered by Dr. Ajay Mathur, Director General, The Energy and Resources Institute (TERI), on ***“Energy for Tomorrow: The Changing Nature of Energy Demand in India”***. Two pre-Dinner talks were delivered by Prof. Vinod Tare, IIT Kanpur on ***“Playing with Water and Water Bodies: For Life and for Business”***, and by Prof. Milind Sohoni, IIT Bombay on ***“Knowledge, Culture and the Development Question”***.

The symposium was organized in four thematic sessions: ***(i) Multifunctional Biomaterials Technology, (ii) Laser Engineering and Technology, (iii) Flexible Electronics, and (iv) Smart Cities***. Each of the four thematic sessions consisted of an introductory presentation by the session organizers followed by four talks and discussion/interaction session. The session organizers (one each from academia and industry) ensured balance of talks on academic and applied aspects. Speakers focused their talks on current cutting-edge research in their disciplines addressed questions pertaining to the major research problems and distinctive tools of their field, the current limitations and how to overcoming these limitations. A panel discussion was held on the topic of ***“International collaboration”***. The symposium ended with the Valedictory session where summarizing of the event was held. The event was well attended by 45 participants from various Academia/R&D/Industry organizations.



1st Row (L-R) Debdeep Mukhopadhyay, Dr. Debrupa Lahiri, Vikranth Racherla, Dr. Deepa Venkitesh, Dr. Ravi Gujjula, Yogesh Nimdeo, Dr. Ashutosh Kumar Dubey, Dr. Navanetha Krishnan S, Dr. Shivananda Wagle, Dr Ravi Hegde, Dr Anshu Gaur, Dr. Ashutosh Tripathi, Dr. Vithyasaagar Sethumadhavan

2nd Row (L-R) Gaurav Chopra, Ashish Ranjan Paul, Shikha Awasthi, Aditi Pandey, Dr Gururaj Telasang, Dr. Nimish Dixit, Alok Dixit, Amit Kumar, Dr. Ronita Bardhan, Dr. Sourab Ghosh, Dr. Riddhi Singh, Shijo Thomas, Dr. Manish Kulkarni, Dr. Rajesh Krishnan, Anuj Jain, NAVROSE

3rd Row (L-R) Dr. Arvind Patel, Dr. A.K. Dutta, Dr. Anil Prabhakar, Dr. Yogesh Joshi, Dr. Sanjay Mittal, Dr. Kantesh Balani, Dr. Bikramjit Basu, Dr. Sandip Patil, Dr. Arun K. Sridharan, Dhananjay Umrao

National Workshop on “Towards Self-Reliance in Advanced Ceramics for Strategic Sectors”

A two-day National Workshop on “**Towards Self-reliance in Advanced Ceramics for Strategic Sectors (ACer-2016)**” was jointly organized by Indian National Academy of Engineering (INAE) and Vikram Sarabhai Space Centre during July 14-15, 2016 at Thiruvananthapuram. Shri. A .S. Kiran Kumar, Chairman, ISRO, Dr. S. Christopher, Secretary, Director General, DRDO and Dr. B. N. Suresh, President, INAE were the Patrons of this workshop.

As the Indian programmes of strategic sectors namely Space, Nuclear and Defence move up and stand at par with those of advanced nations, they pose new challenges as well as open up fresh avenues for the material scientists and engineers in the country. The workshop focussed on thrust areas of Ceramics for electronic and high temperature applications which play a very important role towards meeting the prime goal of space technology namely ‘miniaturization, payload-gain and strategic self-reliance’. The endeavour of this workshop was to bring the associated development teams, user agencies and industries on common platform. Sharing the platform and perspective would also facilitate a synergistic approach towards various issues related to the growth of this field

Ceramics due to their special range of functional properties, excellent thermal resistance and stability, low density and tailorability of their optical, dielectric, magnetic characteristics, play a very prominent role towards meeting the above goals of space technology. Ceramics also find similar special place in the emerging programmes of nuclear and defence sectors. Indigenous initiatives and efforts in this area over one decade or two, have started bearing fruits. In many cases, industries have come forward to scale-up the lab-level process technology.

The topics covered during the subject workshop was related to processing, characterization and application of advanced ceramics. A roundtable discussion among various stakeholders and a panel discussion were organized to formulate a comprehensive approach for further consolidation of the development and production activities was in this important material area in the country. The following broad themes were covered during this two-day workshop:

- Electronic Ceramics
 - Antennas/Resonators/Multiplexer
 - Magnetic Ceramics
 - Lead free ferroelectric, piezoelectric multiferroic materials.
- Ceramics for Opto-Electrics & Photonics
- High & Ultra High Temperature Ceramics
- Light Weight & Porous Ceramics
- Glass & Glass-Ceramics
- Ceramics for Electric & Nuclear Propulsion
- Ceramic Coatings & Thin films
- Structural & Engineering Ceramics

Engineers Conclave 2016

INAE organizes an annual mega event of engineers each year as “Engineers Conclave” (EC) starting from the year 2013, which is being organized jointly with major engineering institutions, essentially to provide a platform for all engineers/scientists to deliberate and address major engineering challenges and opportunities of vital engineering concern to the country. Each conclave has two themes, one specific to the host department and other pertaining to some societal problem where engineering intervention is desired. These two themes are focused from point of view of finding engineering solutions and specific recommendations are formulated for action by the concerned government department and industry. The first “Engineers Conclave” was organized jointly with Defence Research and Development Organization (DRDO) during Sep 17-19, 2013 at New Delhi. The two themes for Engineers Conclave-2013 were “**Production and Manufacturing in Aerospace**” and “**Engineering Interventions in the Sunderbans**”. The second Engineers Conclave 2014 was organized jointly with Indian Space Research Organization (ISRO) on Oct 30 – Nov 1, 2014 at Bangalore. The themes for Engineers Conclave 2014 were “**Emerging Space Applications**” and “**Technologies for Hilly Regions**”. The recommendations emanating from the deliberations of the theme on “Emerging Space Applications” have been submitted to Indian Space Research Organization (ISRO) and those of “Technologies for Hilly Regions” are being actively progressed with Defence Research and Development Organization. The third **Engineers Conclave 2015** (EC-2015) was organized jointly with Department of Atomic Energy (DAE) at BARC, Mumbai from September 7-9, 2015. The themes of Engineers Conclave 2015 were **Green Energy Options for Sustainable Development**, and **Clean India Technologies**.



Chief Guest, Smt. Pranab Mukherjee, Honourable President of India inaugurating EC-2013

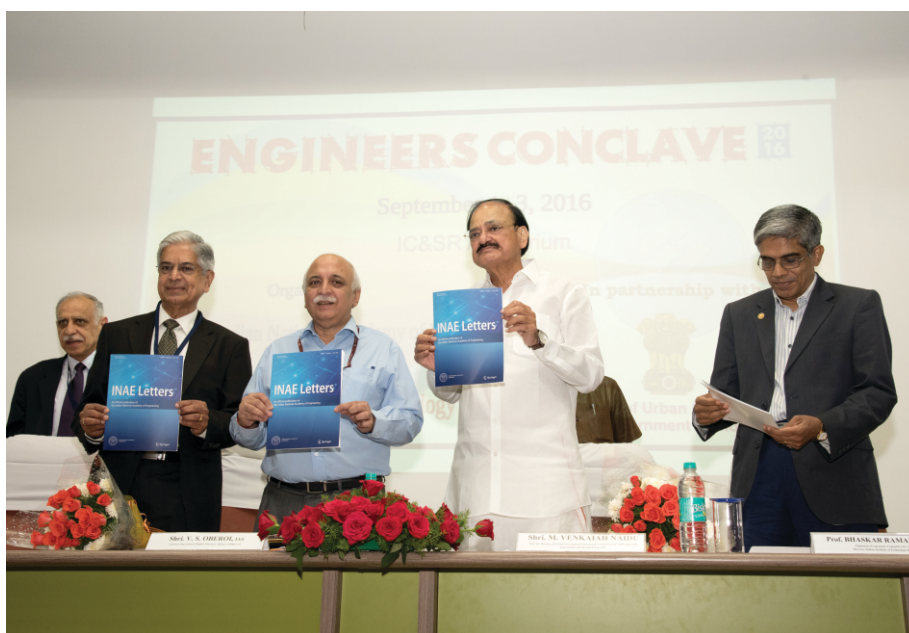


Chief Guest, Shri M Venkaiah Naidu, Hon'ble Minister for Urban Development, Housing & Urban Poverty Alleviation and Information & Broadcasting delivering his address in the Inaugural Session of EC-2016

Engineers Conclave 2016 was held at Indian Institute of Technology (IIT) Madras during Sept 1-3, 2016. Prof. Bhaskar Ramamurthi, FNAE, Director, IIT Madras and Dr BN Suresh, President, INAE were the Co-Chairs of the Engineers Conclave 2016. The Chief Guest of Engineers Conclave 2016, Shri M Venkaiah Naidu, Hon'ble Minister for Urban Development, Housing & Urban Poverty Alleviation and Information & Broadcasting delivered his Address in the Inaugural Session on Sept 1, 2016 at IIT Madras, Chennai. During the Inaugural Session Prof Bhaskar Ramamurthi delivered the Welcome Address; Dr BN Suresh gave an overview of the aim of the conference; whereas the Keynote Address was delivered by Shri Vinay Sheel Oberoi, Secretary, Department of Higher Education, Ministry of HRD, GoI. Prof. C. Balaji, Convener EC 2016 proposed the Vote of Thanks. The first issue of the Research Journal “INAE Letters” was also released by Hon'ble Minister, Shri M Venkaiah Naidu during the Inaugural Session.



(L. to R. Dr BN Suresh, President, INAE, Shri Vinay Sheel Oberoi, Secretary, HRD; Hon'ble Minister, Shri M Venkaiah Naidu and Prof Bhaskar Ramamurthi, Director, IIT Madras in the Inaugural Session)



(L. to R. Dr BN Suresh, President, INAE, Shri Vinay Sheel Oberoi, Secretary, HRD; and Hon'ble Minister Shri M Venkaiah Naidu releasing INAE Letters)

The themes of the Conclave were **“Engineering Education 2020”** coordinated by IIT Madras and **“Smart Cities”** coordinated by INAE. Prof. MS Ananth, FNAE was the Coordinator from IIT Madras for Theme I on “Engineering Education 2020” and Prof Prem Krishna, FNAE was the Coordinator of Theme –II on “Smart Cities”. Eminent experts from Academia, R&D and Industry besides about 70 Fellows of INAE and Executives of the Ministry of Urban Development participated in Engineers Conclave 2016.

Three Plenary Talks by Prof Jagan Shah, Director, National Institute of Urban Affairs, New Delhi; Prof Anurag Kumar, Director, Indian Institute of Science, Bangalore and Prof YV Reddy Former Governor, Reserve Bank of India were organized during the Conclave. The two and a half day Technical programme featured invited talks by eminent experts from Academia, R&D, Government and Industry. The Inaugural Session was followed by two parallel technical sessions on respective themes. Each theme had four technical sessions. The Technical Sessions under Theme I on “Engineering Education 2020” were on: (i) Curriculum and Pedagogy, (ii) Research Excellence and Innovation, (iii) International Benchmarks and MOOCs and (iv) Industry Expectations and Skill Development. Similarly, the Technical Sessions under Theme II on “Smart Cities” were on: (i) Transportation and Architecture, (ii) Urban Water Management, (iii) e-Governance/ICT Enabling and (iv) Energy and Ecology.

A Panel Discussion was held in the morning of Sept 3, 2016 on each of the themes. Prof MS Ananth chaired the Panel Discussion on the theme of “Engineering Education 2020” and Prof Prem Krishna chaired the Panel Discussion on “Smart Cities”. A Valedictory Session was held after the Panel Discussion during which Dr BN Suresh, President, INAE presented the Introductory Remarks while Prof MS Ananth and Prof Prem Krishna presented a summary of the deliberations under the two themes of “Engineering Education 2020” and “Smart Cities” respectively. Prof Bhaskar Ramamurthi, Director IIT Madras delivered the Valedictory Address during the Valedictory Session. During the Valedictory Session the recommendations emanating from the two days deliberations were summarized.

Round Table on “Clean Coal Technologies in India: Current Status, Demands and Aspirations – Pathways to Achievements”

DST planned to invite research proposals in the area of clean coal technologies to overcome the existing gaps in technologies. DST requested INAE to convene a meeting of experts from INAE, R&D, industry and Academia and assist in identifying the thrust areas of research in Clean Coal technologies for inviting of proposals by DST. Accordingly, INAE identified suitable experts and conducted a Round Table meeting on the topic **“Clean Coal Technologies in India: Current Status, Demands and Aspirations – Pathways to Achievements”** on June 10, 2016 at New Delhi under the chairmanship of Dr. Baldev Raj, Immediate Past President, INAE wherein about 35 domain experts from INAE, Industry, Academia and R&D participated. Prior to the meeting, a Base Paper covering the pertinent issues in the area of Clean Coal technologies was prepared which was circulated to the participants for discussion in the first-Round Table meeting. The objective of the round table was to examine **the current status of clean coal technologies nationally and internationally and identify the areas where research can be initiated to develop the technologies to overcome the gaps**. Dr R Chidambaram, Principal Scientific Adviser to the Govt. of India and Prof Ashutosh Sharma, Secretary, Department of Science and Technology (DST), Govt. of India, the Chief Guests delivered their address in the Inaugural Session of the workshop.

During the first meeting, the experts deliberated on the current status of the technologies available in India vis a vis the current international status of Clean Coal technologies; so as to assist in identifying the gaps/voids which need to be addressed on priority. During the deliberations in the first Round Table it was decided that the technical papers in areas requiring technical interventions so as to prepare a comprehensive report highlighting the specific areas of Clean Coal technologies be compiled. Accordingly, the experts were identified for authoring the technical papers on the areas identified. The experts were also requested to identify the areas of immediate concern where research proposals could be initiated by DST to overcome the gaps in the existing technologies.



Dr Baldev Raj, Director, NIAS addressing the audience on June 10, 2016. Seated (L to R) Brig Rajan Minocha, ED ,INAE; Dr BN Suresh, President, INAE; Dr R Chidambaram, PSA to Govt. of India and Prof Ashutosh Sharma, Secretary, DST

During the final session of the workshop, it was decided to prepare a comprehensive report highlighting the specific areas, gaps if any, and further actions needed to bridge the gaps, including the identification of research areas where further funding can be considered. The specialists were also identified to prepare the report and the inputs have since been obtained from the authors on the topics identified during the subject Round Table.



*Prof Ashutosh Sharma,
Secretary, DST Addressing the
gathering*



Dr R Chidambaram, PSA to Govt of India delivering his Address

During the second Round Table meeting on “Clean Coal Technologies in India: Current Status, Demands and Aspirations – Pathways to Achievements” held on Oct 26, 2016 at New Delhi; the papers submitted by the authors identified earlier were discussed and suggestions were invited for suitable research proposals emanating from the inputs; for submission to DST for consideration for funding of projects. The meeting was attended by 25 experts in the area of Clean Coal technologies. During this meeting a total of about 12 proposals were also discussed and approved for submitting to DST. The authors were requested to submit the details of the proposals covering Background; Timeframe; Ball Park Cost and Participating Agencies for onward submission. Subsequently, 11 research proposals received covering various aspects of Clean Coal technologies were submitted to DST for consideration during a meeting on Nov 19, 2016.

DST subsequently requested INAE to prioritize the 11 proposals submitted to assist in phasing out the call for proposals to be undertaken. Accordingly, the third meeting of a Committee under the Chairmanship of Dr Baldev Raj comprising of Dr BN Suresh, President, INAE; Shri B Prasada Rao, FNAE, Dr Sanjay Bajpai, Adviser/ Scientist ‘G’, DST and Shri DP Misra, FNAE as Members was held on Dec 29, 2016 at NIAS, Bangalore to prioritize the research proposals. During this meeting, it was decided that all 11 proposals are important and should be considered for funding simultaneously in a phased manner by DST. DST had invited the research study proposals on the topics of Clean Coal technologies identified for forwarding by April 7, 2017. A total of 6 research proposals on Clean Coal technologies were submitted by INAE Fellows in response to the advertisement.

INAE-SIATI Seminar on “Innovations in Technologies, Processes, Machine Tools and Quality Control for Manufacturing Excellence”



Inaugural Session – L to R: Dr AR Upadhyay, Dr BN Suresh, Shri AS Kiran Kumar, Dr CG Krishnadas Nair, Shri Kaveri Ranganathan

The INAE-SIATI Seminar on **“Innovation in Technologies, Process, Machine Tools & Quality Control for Manufacturing Excellence”** organized jointly by Indian National Academy of Engineering (INAE) and Society of Indian Aerospace Technologies and Industries (SIATI) On Dec 2-3, 2016 at Hindustan Aeronautics Limited (HAL), Bangalore as a part of the SIATI Silver Jubilee Celebrations.

Shri AS Kiran Kumar, Secretary, Department of Space and Chairman ISRO was the Chief Guest. Dr BN Suresh, President, INAE and Shri Kaveri Renganathan, CEO, HAL, Bangalore were the Guests of Honour. Dr CG Krishnadas Nair, FNAE, President, SIATI delivered the Welcome Address during the Inaugural Session on Dec 2, 2016 while the Inaugural address was delivered by the Chief Guest Shri AS Kiran Kumar, Secretary, Department of Space and Chairman ISRO. This was followed by the Presentation of awards, Inauguration of the Seminar and Address by Dr BN Suresh, President, INAE. Shri Kaveri Renganathan, delivered his address and the Silver Jubilee Special Issue was released. Dr AR Upadhyay, FNAE, Chairman, Organizing Committee proposed the Vote of Thanks. There were five technical sessions and a concluding Academy-Industry Interaction. The format of the seminar included five Technical Sessions, an “Academy Industry Interaction workshop” and a Panel Discussion on “National Manufacturing Policy and Development Funds for Innovations in Manufacturing” on the second day. There were ten presentations on the first day and nine presentations on the second day on different topics in manufacturing to include latest trends in CNC Manufacturing; Complex Aerospace; Advanced Technology Trends in Jet Engines; Multiprocess Machining; innovations in Smart/intelligent Machining; High Productivity quality improvement techniques, Advancement of Technology; Smart Manufacturing; Rapid Prototyping; 3D Printing; Automation; Robotics etc. An interaction workshop on ‘Technological Trend in bridging the Academia-Industry gap’ was held during the Academy Industry Interaction. To conclude the seminar, the Panel Discussion was held on ‘National Manufacturing Policy and Development Funds for innovations in manufacturing’. Dr. CG Krishnadas Nair, Dr. AR Upadhyay, Air Cmde (Retd) N Kumar, Shri R Vivekanandah and Prof. Gurumoorthy were the panelists for this Panel Discussion. Members of the Panel discussed the various ways and means to increase the manufacturing base in India through innovation

and automation. They are in the opinion that the India should adopt their own design and manufacturing model.

IEEE-INAE Symposium on Electromagnetic Education and Research

The IEEE-INAE Symposium on “**Electromagnetic Education and Research**” was held during Dec 12-13, 2016 at SSN College of Engineering, Kalavakkam, Tamil Nadu. The event was jointly organized by Institute of Electrical and Electronics Engineers (IEEE), Madras Chapter and INAE. The symposium featured invited talks by established academics and researchers in the areas of electromagnetics, antennas and propagation, and a doctoral research presentation session.

The symposium Chairs were Prof S.V. Kulkarni, FNAE and Associate Dean-II (Infrastructure, Planning & Support), Indian Institute of Technology Bombay and Prof KT Selvan, Department of Electronics and Communication Engineering, SSN College of Engineering, Kalavakkam. The format of the symposium included an Opening Session to feature a Keynote Address by Dr B.N. Suresh, President, INAE & Vikram Sarabhai Distinguished Professor, Indian Space Research Organization (ISRO), Bengaluru on the topic of “Engineering education to meet industry expectations”. An Education Session which included three talks along followed by two Research Sessions to include four speakers in each session were held. A Contributed Session chaired by Prof. Parveen F. Wahid, University of Central Florida, USA was conducted in which presentations by Doctoral students were made.

Education Session consisted of three talks by the eminent educationists to include Prof R.K. Shevgaonkar, Fellow, Department of Electrical Engineering, Indian Institute of Technology Bombay on the topic of “Teaching electromagnetic waves in an effective way”; by Prof. Harishankar Ramachandran, IIT Madras on “The role of group and phase velocities in beam propagation in dispersive and nonlinear media” and by Prof S.V. Kulkarni on “A virtual interactive electromagnetic laboratory - an effective pedagogical approach”.

During the Concluding Session a ‘Graduate Travel Award’ was awarded to one of the speaker who made presentations during the Contributed Session. This award had a certificate and a cheque for an amount that will cover the student’s travel cost to attend the symposium.



Group Photograph of Participants at IEEE-INAE Symposium on Electromagnetic Education and Research

INAE-TERI-ETC Workshop on “Energy Transitions – The Global Challenges & Opportunities” held on Feb 13, 2017 at New Delhi

INAE, The Energy and Resources Institute (TERI) and ETC jointly organized the Workshop on “**Energy Transitions – The Global Challenges & Opportunities**” on Feb 13, 2017 at India Habitat Centre, Lodhi Road, New Delhi. Dr Ajay Mathur, FNAE, DG TERI was the Convener of the Workshop. Mr Ashok Chawla, Chairman, TERI delivered the Welcome Address in the Inaugural Session followed by presentations by Lord Adair Turner, Chair- Energy Transitions Commission, Dr Ajay Mathur, FNAE, DG TERI and Dr BN Suresh, President, INAE. The Chief Guest Mr. Piyush Goyal, the Hon’ble Minister of State with Independent Charge for Power, Coal, New and Renewable Energy and Mines inaugurated the subject Workshop and released three reports viz. INAE Research Study Report on “Engineering Interventions Necessary for Achieving 175 GW of Renewable Power by 2022”; TERI Report on “Transitions in Indian Electricity Sector 2017-2030” and the Energy Transitions Commission (ETC) Report on “Shaping Energy Transitions” during the Inaugural Session and delivered the Ministerial Address. In addition, Special Addresses were delivered by Mr Susheel Kumar, Secretary, Ministry of Coal, Ms. Shalini Prasad, Additional Secretary, Ministry of Power and Mr Rajeev Kapoor, Secretary, Ministry of New and Renewable Energy and Mines, Government of India.

The Workshop featured three Technical Sessions on “Global Energy Transitions”; “Indian Electricity Transitions” and “Indian Renewables Challenge”. Mr Pradeep Chaturvedi, FNAE, Coordinator of the INAE Research Study on “Engineering Interventions Necessary for Achieving 175 GW of Renewable Power by 2022” presented the findings of the report during Session 3 of the event. The technical sessions were followed by the Valedictory Session during which Mr Pradeep Kumar Sinha, Cabinet Secretary, Government of India delivered the Valedictory Address. The Workshop ended with the Vote of Thanks by Dr Ajay Mathur, DG, TERI.

The INAE Research Study Report “Engineering Interventions Necessary for Achieving 175 GW of Renewable Power by 2022” has been converted to an e-flipbook form and has been uploaded on INAE website.



Release of the three Energy Reports by Mr. Piyush Goyal, the Hon’ble Minister of State with Independent Charge for Power, Coal, New and Renewable Energy and Mines (second from right)

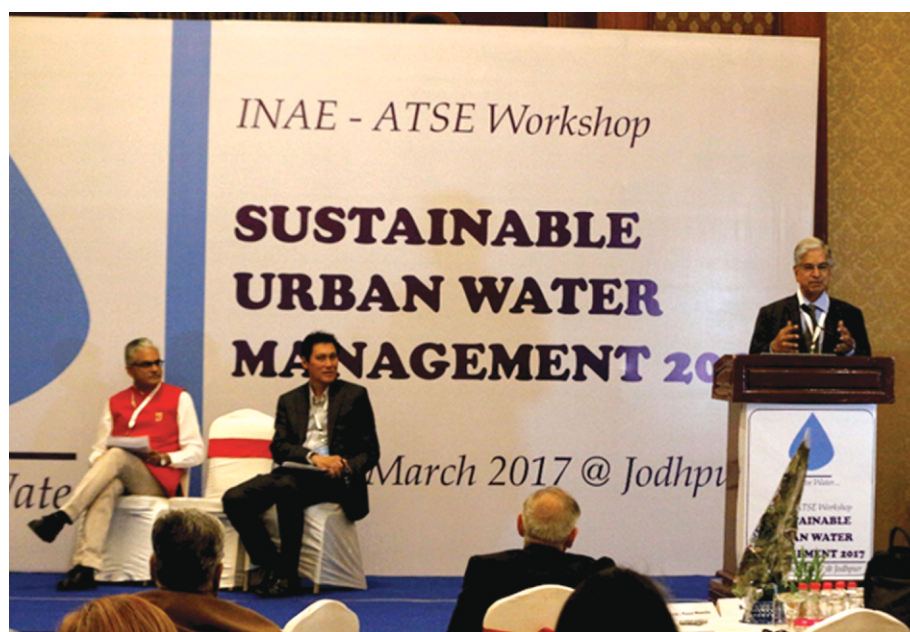


Dr BN Suresh, President, INAE delivering his Address in the Inaugural Session

Seminars/Workshops/Conferences –International

INAE-ATSE Sustainable Urban Water Management Workshop

The INAE- Australian Academy of Technological Sciences and Engineering (ATSE) joint Workshop **“Sustainable Urban Water Management”** was held on March 13-16, 2017 at Jodhpur. Prof. CVR Murty, Director, IIT Jodhpur was the coordinator from INAE and Prof. Tony Wong was the coordinator from ATSE. The Workshop had a well-structured Agenda and useful recommendations are expected to be generated. Eight delegates from Australia and 25 experts from various national organisations participated in the Workshop. The Workshop was inaugurated by Dr. B. N. Suresh, President, INAE, on the 13 March 2017. And the most revered moment was the participation of the Maharaja of Jodhpur, His Highness Gaj Singh II, who delivered a pre-dinner talk on Water thoughts for the participants to dwell on.



Dr BN Suresh, President, INAE Delivering his Address

The Workshop was aimed at starting the conversation, focusing on a selected number of priority themes, and influencing a transformative change in the way urban water services are delivered and managed in cities. These are necessary in responding to future uncertainties and vulnerability brought about by an increasing world population that are concentrated in cities, a continually evolving economic and governance structure and a changing climate. During the Workshop, the focus was on: Availability and Distribution, Quality and Treatment, and Policy and Management of water in Urban Areas. Speakers and Participants were intensely engaged in deliberations along three tracks, namely: (1) Integrated Approach to improving Sanitation & Sewerage Services, (2) Securing Urban Water Supply through Coordinated Demand & Supply Side Innovative Management, and (3) New Urban Water Governance & Community Engagement for Integrated Urban Water Services.

During the breakout sessions of the Workshop, the Participants were divided into three groups. They discussed and explored following four issues (along each of the said three tracks), namely: (a) Identifying

and Understanding the Challenges, (b) Inter-linkages and Cross-Disciplinary Issues, (c) Emerging Knowledge, Technology and Innovative Solutions, and (d) Strategies and Implementation Plans. The diverse and dynamic group of Speakers and Participants provided in-depth insights, priority projects and series of policy interventions to develop the required position paper, beneficial to both, India and Australia. Shortly, the speakers shall bring out a report in the form of a Position Paper. This Position Paper will provide road map along these three tracks – as to what India’s and Australia’s focus should be and as to which approach the two countries should take towards making WATER a sustainable resource in the years to come.



Group Photograph of the Delegates

Joint Workshop between Indian National Academy of Engineering (INAE) and National Academy of Engineering of Korea (NAEK) on “High Temperature Materials”

The two and half day joint Workshop between Indian National Academy of Engineering (INAE) and National Academy of Engineering of Korea (NAEK) on **“High Temperature Materials”** was held on March 16-17, 2017 at Indian Institute of Science, Bangalore. Dr. AR Upadhy, Dr Raja Ramanna DRDO Distinguished Fellow, Aeronautical Development Agency, Ministry of Defence, Govt of India, Bangalore and Prof Dipankar Banerjee, Indian Institute of Science, Bangalore were the Coordinators of the event from INAE side. The workshop was inaugurated by Dr. V.K. Aatre, former Scientific Advisor to the Defence Minister and Secretary, Department of Defence Research and Director General, Defence Research and Development Organisation. Dr. B. N.Suresh, President INAE addressed the participants and the Korean delegates on the first day. Dr. Kyung Ho Shin, KIST, leader of the Korean delegation participated in the inaugural function and addressed the delegates. Both Dr. Aatre and Dr. Suresh emphasized on the necessity for concrete steps in following up the workshop with an identification of focused collaborative programmes prior to the next joint meeting to be held in Korea. Dr Banerjee elaborated on the workshop programme and also proposed a Vote of Thanks.



Inauguration: Dr. Shin, Leader Korean Delegation, Addresses the Delegates

The workshop was attended by 11 participants from the Republic of Korea, with 7 talks on various topics, and 20 participants from India with 13 talks. The programme covered the current and future directions in high temperature materials ranging from high temperature alloys & polymer matrix composites to and ultra high temperature composites, as envisaged by the Indian and Korean participants. Participants from India included scientists from DRDO, DAE, ISRO, CSIR and DST and from IISc & IIT Kharagpur while participants from Korea included scientists from Korea's major academic and R&D institutions and industry. Applications in DAE, ISRO, DRDO and A-USC power plants were covered in the last two sessions including the status in Korean industry.



Korean Delegates Visit IISc. Bangalore



Dr. BN Suresh, President INAE meets the Korean Delegates

The workshop concluded with a Panel Discussion between INAE and NAEK experts to bring out the recommendations and Way Forward for the subject workshop. The coordinators of the Panel Discussion were Dr. V. K. Aatre, Dr. Kyung Ho Shin, Prof. Vikram Jayaram, and Prof. Dipankar Banerjee. Brief presentations were made by the Indian and Korean participants indicating potential areas for collaboration followed by a discussion from the participants. The Panel Discussion identified coordinators from Indian and Korean sides in 3 major areas: (i) aluminum alloys and polymer matrix composites (ii) titanium and nickel base superalloys and high temperature steels, and (iii) high temperature materials based on refractory metals, SiC based continuous fibre composites and ultra high temperature ceramic matrix composites.

INAE Study Group on Indian Engineering Heritage (Metallurgy)

Workshop on “Indian Heritage Metallurgy – Recent Developments and Future Directions”



Dr Baldev Raj, FNAE, Director, NIAS, Bangalore – the Chief Guest, addressing the participants

A Study Group of Indian Engineering Heritage on Metallurgy was constituted to carry out studies related to metallurgical heritage. Prof. S Ranganathan, FNAE, NASI Platinum Jubilee Fellow, Indian Institute of Science, Bangalore; Dr. Baldev Raj, Past-President, INAE & Director, National Institute of Advanced Studies (NIAS), Bangalore, and Dr. S Srikanth, FNAE & Director, National Metallurgical Laboratory (NML), Jamshedpur are the three co-Chairman of the Study Group. Dr. U. Kamachi Mudali, FNAE & Director, Materials Chemistry and Metal Fuel Cycle Group, Indira Gandhi Centre for Atomic Research, Kalapakkam is the Chairman of the Study Group.

INAE Study Group on “Indian Engineering Heritage – Metallurgy” organized a two-day Workshop on **“Indian Heritage Metallurgy – Recent Developments and Future Directions”**, at SASTRA University, Tanjore, on January 27-28, 2017 in association with SASTRA University, Tanjore. Dr U Kamachi Mudali, was the Coordinator of the workshop. The objective of the workshop was to deliberate upon the current status of metallurgical heritage study, and arrive at recommendations to move forward so as to utilize the recent data and analysis to unravel the mystery and excitements in ancient metallurgical objects. In this regard, specialists of Heritage Metallurgy were invited to Tanjore, a famous location for various metallurgical achievements in the past – bronzes, cannons, metal plates, buildings and architecture. The workshop was attended by 20 specialists and 15 scholars in metallurgy heritage besides faculty and students from SASTRA University. Dr U. Kamachi Mudali, FNAE, welcomed the gathering of 35 delegates and gave a brief overview on the objective of generating information and creating a database through systematic studies of

various archaeological objects. Dr. Baldev Raj, Past-President, INAE & Director, NIAS, Bangalore, the Chief Guest, suggested that the workshop should highlight the newer techniques and their utilisation, and create awareness among the professionals engaged in archaeo-metallurgy studies. The Concluding Session started with a request from Dr. U. Kamachi Mudali to all members to express their views, way forward and contributions to studies on ancient metallic objects. The deliberations during the Workshop were appreciated by the experts who participated in the event.



Research Studies

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

INAE had instituted research studies to encourage its Fellowship in developing collaborative ventures with leading academic and research institutions specializing in various engineering disciplines with the objective of developing new capabilities in areas of direct interest. In this regard, INAE invited proposals for short term research projects on frontier areas of engineering with the objective to develop and validate novel engineering concepts to include generation of a new idea / theoretical or practical concept / a novel product including software / hardware / algorithm / an innovative process to produce a product and allied areas, which may have future applications. The novelty or innovation content of the projects was the main focus.

Under this programme, a Research Study on **“Development of a robust and User Friendly Software Package for White Light Based Stress using Digital Photoelasticity”** was approved and the aim of the study was to develop a comprehensive software package for white light based stress analysis using Digital Photoelasticity.

As a result of this study, a DigiTFPTM software has been developed which is capable of exploiting the colour information to extract both isoclinic (orientation of principal stress direction) and isochromatic (difference in principal stresses) parameters over the complete model domain using the latest developments in the field. For a variety of problems, one mostly requires only isochromatic data. DigiTFPTM can provide isochromatic results from a single dark field image of the model recorded in colour. In case, one requires the isoclinic data also, the software would require four plane polariscope images recorded in colour having 0° , 22.5° , 45° and 67.5° isoclinics. The software also has an advanced feature to extract isochromatic data from four polarisation stepped plane polariscope images. A one day workshop was held at IIT Madras with an aim to disseminate the development of a useful software product to the prospective users. The users provided their experience in using the software and suggestions for improvement in its navigation, requirement of any additional features and user friendliness of the Graphic User Interface. The same has been considered and implemented in the software.

Research Schemes

INAE Chair Professorship

INAE Chair Professorship was instituted in order to encourage engineers/technologists with outstanding research contributions, promote long-term participation in academic research and enhance the research standards in academic institutions. INAE Fellows between the ages of 45 and 65 years, working in well-recognized teaching/research institutions in India are eligible for consideration.

The following nomination were selected as INAE Chair Professor.

- Prof HM Suryawanshi, Professor, Department of Electrical Engineering, Visvesvaraya National Institute of Technology, Nagpur.
- Prof. AK Bhowmick, Prof of Eminence, Rubber Technology Centre, Indian Institute of Technology Kharagpur, Kharagpur

Mentoring of Engineering Teachers by INAE Fellows

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

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

S. No	Name of Engineering Teacher	Institution of Teacher	Name of Mentor	Organization of Mentor
1	Ms M Chaithanya Sudha	VIT University, Vellore	Prof S Mohan	IIT Madras
2	Dr Aseem Chandel	BSA College of Engineering & Technology, Mathura	Prof SN Singh	IIT Kanpur
3	Ms Mithilesh Mahendra	Tulsiramji Gaikwad-Patil College of Engineering, Nagpur	Dr DP Kothari	SB Jain Institute of Technology, Management and Research, Nagpur
4	Dr Vishvesh J Badheka	Pandit Deendayal Petroleum University, Gandhinagar	Dr J Krishnan	MS University, Lonere, Maharashtra
5	Ms Sachin Ganeshrao Solanke	Saraswati College of Engineering, Navi Mumbai	Mr AK Sinha	formerly at BARC
6	Mr Puneet Saini	ITS Engineering College, Greater NOIDA	Prof DV Singh	Visitor, Amity University, NOIDA

7	Mr PVS Lakshminarayana	Mahatma Gandhi Institute of Technology Hyderabad	Dr G Madhusudhan Reddy	DMRL Hyderabad
8	Mr Kappala Durga Rao	Malla Reddy College of Engineering and Tech Secunderabad	Dr G Venkateswara Rao	Retired
9	Dr GP Ganapathy	VIT University, vellore	Dr RK Bhandari	Member, Advisory Committee NDMA
10	Dr Vandana Sreedharan	Govt. College of Engineering, Kanur	Prof A Sridharan	formerly at IISC Bangalore
11	Dr Dharmendra Tripathi	Manipal University Jaipur	Prof Suman Chakraborty	IIT Kharagpur
12	Ms Warisha Meraj	IFTM University Moradabad	Prof Sukumar Mishra	IIT Delhi
13	Dr Taimoor Khan	NIT Silchar	Prof Shibani Koul	IIT Delhi
14	Mr R Ramesh	PSG College of Technology Coimbatore	Dr AK Bhaduri	IGCAR Kalpakkam
15	Mr. Kali Charan Pradhan	Indira Gandhi Institute of Technology (IGIT), Sarang, Dhenkanal, Odisha	Prof. Dr. PK Dash	Siksha 'O' Anusandhan University, Bhubaneswar

Mentoring of Engineering Students by INAE Fellows

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

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

S. No	Name of Engineering Student	Institution of Student	Name of Mentor	Organisation of the Mentor
1	Mr Deepayan Banik	Indian Institute of Engineering Science and Technology, Shibpur	Prof Sanjay Mittal	IIT Kanpur
2	Mr Tushar Shandhilya	AMU Aligarh, Zakir Hussain College of Engineering and Technology	Prof Nikhil R Pal	ISI Kolkata
3	Ms Ankita Pal	Jalpaiguri Govt. Engineering College (W.B.)	Prof Nikhil R Pal	ISI Kolkata
4	Mr Gourav Mundhra	NIT Durgapur	Prof KT Jacob	IISc Bangalore

5	Mr Angshuman Pal	Jadavpur University, Kolkata	Prof Suman Chakraborty	IIT Kharagpur
6	Mr Soudeep Dhar	Jadavpur University Kolkata	Prof Saptarshi Basu	IISc Bangalore
7	Mr Sai Vishnu Vardhan Kupalli	IIT Bhubnaeswar	Prof Saptarshi Basu	IISc Bangalore
8	Mr Siva Heramb Peddada	IIT Bhubaneswar	Prof Pradip Dutta	IISc Bangalore
9	Mr Mainak Saha	NIT Durgapur	Prof BS Murty	IIT Madras
10	Ms Himanshi Dhawan	UPES, Dehradun	Dr Sirshendu De	IIT Kharagpur
11	Mr Sumedh Kanade	VNIT Nagpur	Dr K Bhanu Sankara Rao	MGIT Hyderabad
12	Ms Devara Vijaya Lakshmi	RGUKT NUZVID	Dr K Bhanu Sankara Rao	MGIT Hyderabad
13	Mr Mohammed Muzammil Ahmed	NIT Warangal	Dr DK Likhi	MIDHANI Hyderabad
14	Ms Tanishka M Rathi	VNIT Nagpur	Dr DK Likhi	MIDHANI Hyderabad
15	Ms Sulagna Sarkar	Jadavpur University Kolkata	Prof Bikramjit Basu	IISc Bangalore
16	Mr Vipin Kumar Yadav	ITS Engineering College, Greater NOIDA	Prof DV Singh	Amity University
17	Ms Tanya Purwar	Indian Institute of Engineering Science and Technology, Shibpur	Dr Prahlada Ramarao	formerly CCDRDO
18	Ms Rama Hitardha	NIT Warangal	Dr G Madhusudhan Reddy	DMRL Hyderabad
19	Ms Papolu Aishwarya	Mahatma Gandhi Institute of Technology Hyderabad	Dr G Madhusudhan Reddy	DMRL Hyderabad
20	Ms Ponduru Sravani	RGUKT, NUZVID	Dr SV Kamat	DMRL Hyderabad
21	Mr Shivansh Chanshoria	VNIT Nagpur	Dr SV Kamat	DMRL Hyderabad
22	Mr P Naga Sai Babu	RGUKT NUZVID	Prof G Sundararajan	IIT Madras
23	Ms Kathi Kavya	NIT Warangal	Prof G Sundararajan	IIT Madras

24	Mr Abhilash Mishra	Veer Surendra Sai University, Burla	Prof Ganapati Panda	IIT Bhubaneswar
25	Mr C Aswani Kumar	Vignans Foundation for Science Technology and Research University, Guntur	Prof SV Kulkarni	IIT Bombay
26	Ms Joyeeta Chatterjee	Manipal university Jaipur	Prof Sankar K Pal	ISI Kolkata
27	Mr Deepan Das	Indian Institute of Engineering Science and Technology, Shibpur	Dr BB Chaudhuri	ISI Kolkata
28	Ms Soumya Sourav Sarangi	Veer Surendra Sai University, Burla	Dr Soumitra Tarafder	NML Jamshedpur
29	Sukanta Goswami	Indian Institute of Engineering Science and Technology, Shibpur	Dr Soumitra Tarafder	NML Jamshedpur
30	Mr D Dhanaji Patil	College of Engineering Pune	Prof S Ranganathan	IISc Bangalore
31	Mr Chetan Anand	Indian Institute of Engineering Science and Technology, Shibpur	Prof DN Singh	IIT Bombay
32	D Pulleti Sai Aditya	IIT Guwahati	Prof Neelesh B Mehta	IISc Bangalore
33	Ms Meghna Jha	UPES, Dehradun	Prof Yogesh M Joshi	IIT Kanpur
34	Mr Saikat Dey	Indian Institute of Engineering Science and Technology, Shibpur	Prof Vivek Agarwal	IIT Bombay
35	Mr Rakesh Acharya	NIT Durgapur	Prof KJ Vinoy	IISc Bangalore
36	Mr. Thandrapally Nagaraju	Rajiv Gandhi University of Knowledge Technologies, Nirmal	Prof. U Ramamurty	IISc Bangalore
37	Mr. Mayank Kumar	Indian Institute of Space Science and Technology, Thiruvananthapuram	Dr. AR Upadhyaya	NALTECH LTD. Bangalore
38	Mr. Jugal V Parmar	National Institute of Technology, Surathkal	Prof. Sukumar Mishra	IIT Delhi
39	V Sai Deepthi	Matrusri Engineering College (Osmania University), Hyderabad	Dr. S Bimalkhedkar	IGS (India) Pvt Ltd., PES University Campus, Bengaluru

40	Debapriya Basu	Jadavpur University, Kolkata	Prof. R Sarathi	IIT Madras
41	Kathan Mehta	Pandit Deendayal Petroleum University, Raisan, Gandhinagar	Dr. Krishnan Jalpesan	MS University, BATU, Lonere, Maharashtra
42	Rajdeep Banik	National Institute of Technology, Durgapur	Prof. Rahul Mitra	IIT Kharagpur
43	Duggirala Prithvi Krishna Paraso	Matrusri Engineeirng College (Osmania University), Hyderabad	Dr. VK Agarwal	PES University, Bangalore
44	Vaddeboina Mounika Reddy	Matrusri Engineeirng College (Osmania University), Hyderabad	Dr. N Venkatesh	Redpine Signals, Inc., Hyderabad
45	Sant Saran	Dayalbagh Educational Institue, Agra	Prof. Anurag Sharma	IIT Delhi
46	Sravani Bijja	Univeristy College of Engineering, Osmania University, Hyderabad	Prof. Shiban Koul	IIT Delhi
47	Piyush Garg	IIT Roorkee	Prof. Shiban Koul	IIT Delhi



INAE Forums

Forum on Technology Foresight and Management

INAE Forum on Technology Foresight and Management for addressing National Challenges was constituted with the mandate to evolve solutions keeping in view the issues of sustainable development, poverty reduction, and climate change in focus and suggest appropriate technologies accordingly. Further, suitable Engineering Management techniques will be employed to find cost effective and optimal solutions.

Dr. VK Agarwal, Formerly Chairman Railway Board & Ex-officio Principal Secretary, Govt. of India & Formerly Director Steel Authority of India is the Chairman of the Forum. The members include Dr. YP Anand, Formerly Chairman Railway Board & Ex-Officio Principal Secretary, Govt. of India; Prof. Prem Vrat, Vice-Chancellor and Professor of Eminence, ITM University, Gurgaon & Formerly Vice-Chancellor UP Technical University, Lucknow; Dr. CR Prasad, CMD, Everest Power Pvt. Ltd., New Delhi & Formerly CMD, GAIL, New Delhi ; Mr. Anil Kumar Anand, Director Technical – Microtrol Sterilisation Services, Mumbai & Formerly Director (Reactor projects Group), BARC, Mumbai; Mr. Kishore Pal Singh, Formerly Managing Director RITES, New Delhi; Mr. Suresh Chandra Gupta, Formerly Member Electrical Railway Board & Ex-officio Secretary to Govt of India; Mr. Vinoo Narain Mathur, Managing Director, Formerly Member Traffic Railway Board & Ex-Officio Secretary to Govt. of India and Mr. Arun Kumar Gupta, Formerly Director Oil India Ltd.

The Forum had selected the five National Challenges given below for detailed study / examination with a view to foresee the needed futuristic technologies and to evolve suitable engineering management solutions.

- Energy – Major thrust on Solar
- Water Management
- Agriculture – Waste reduction and its Use
- Transport – Making it Greener
- Waste Management.

The Second report of the forum was published during 2016 which covered the aspects of Agriculture-Waste Reduction and its use; Energy-Major Thrust on Solar and Mass Transit Systems. The first report of the forum was published earlier during 2014 covering the issues related to Waste Management, Water-Meeting the Future Challenges and Transport – Making it Greener. Both the reports are available for open access at Publications page of INAE website www.inae.in

Forum on Engineering Interventions in Disaster Mitigation

The Forum on Engineering Interventions for Disaster Mitigation was constituted by INAE Governing Council on 26th July 2013 after intensive discussions within the Fellowship held during January-July 2013. It has the mandate to pursue key areas of national priority in the field of Disaster Risk Reduction, where INAE can play a significant role-through its rich pool of multi-disciplinary expertise. Dr R.K. Bhandari FNAE is the Chairman of the Forum.

For the period under report, the Forum primarily focussed on mitigation of disasters due to Landslides and Floods. The progress made in both these areas, in terms of the outputs and the outcome, is presented in

this report. The main thrust of the Forum at this time is to sustainably engage with the relevant ministries and institutions of the government towards implementation of the Actionable Recommendations on Landslide risk mitigation, arrived at through in-depth scientific studies, nation-wide consultations and roundtable meetings. The Forum has recently launched a Medium Term Research Study (MRTS) on Lessons from two of the most spectacular landslide disasters in India, aimed at delivering knowledge products to bolster engineering education and practices in landslide studies.

The Forum's major achievement so far has been (1) delivery of a comprehensive set of Actionable Recommendations on Landslide Risk Reduction (evolved for the first time, through a year-long, nation-wide consultations, and two national level Roundtable meetings held in the months of May and November 2015), (2) intensive and sustained follow-up with the NDMA, NIDM and the relevant ministries and departments of the Government of India towards expeditious implementation of the recommendations (3) finalization of the study report on Urban Floods, with Actionable Recommendations. Dr C.D. Thatte FNAE, formerly, Secretary, Ministry of Water Resources led this study. A Study Team for Urban Flooding (STUF) was constituted for the purpose and its meeting was held on 30 June 2016, attended by academia and concerned agencies such as Municipal Corporation of Mumbai; National Institute of Hydrology, Roorkee; National Environmental Engineering Research Institute, Nagpur and Bureau of Indian Standards.

The Actionable Recommendations (AR's) of the two roundtable meetings on Landslide disaster mitigation were widely publicized and vigorously pursued at all levels. Volume 1 of the proceedings presented AR's and Volume 2 provided well argued scientific basis in support of the recommendations. Gen N.C.Vij, the founder VC of NDMA, personally wrote letters to the Ministers of Home, Defence and Science and Technology recommending implementation of the items pertaining to their respective ministries. Simultaneously, the recommendations were formally presented by the Forum Chairman at a technical session on the 11th Formation Day of the National Disaster Management Authority. Wider publicity to the recommendations was given by through papers published in the Journal of Current Science (Vol107, No4, 25 August 2014) and elsewhere. Further, the Forum Chairman discussed the recommendations in great detail with Secretary, Ministry of Earth Sciences and Lt Gen N.C, Marwah, the concerned member of NDMA. Thereafter, the recommendations were disseminated through wide circulation and technical presentations at the related national meetings and conferences. NDMA finally constituted a Task Force on landslides on 29 June 2016 and drew specific attention to the INAE recommendations in its Terms of Reference. Forum responded to the NDMA proposal in detail on 4th August 2016.

The most significant recommendation made by the Forum was to establish an autonomous and empowered National Centre for Landslide Research, Studies and Management. After giving considerable thought to the recommendation, NDMA not only accepted the recommendation but also drafted a detailed proposal for soliciting comments from the stakeholders and other domain experts. In response, the INAE Forum responded with a detailed comments and the associated scientific reasoning. The proposal is currently in the melting pot. Since the Chairman of the Forum and Dr C V R Murty, a member of the INAE Forum are both serving members of the NDMA's National Advisory Committee constituted on 21 October 2016, a more intensive follow-up should be possible.

The Forum has been holding its meetings from time to time to review progress, ensure timely mid-course corrections and guide the projects activities. The meeting of the Forum held on December 8, 2016 is significant in this regard, being held on the sidelines of INAE Annual Convention, many domain –related fellows could also participate. The suggestions made at this meeting have helped the Forum in shaping its future plan of action.



The meeting of the Forum held on 30 August 2016 discussed and adopted Dr Thatte's report on urban floods for further action. It also gave impetus to the MTRS on Lessons from Landslide disasters. Inter alia, detailed discussions were held on items such as (1) developing a new programme on Earthquake risk reduction and (2) implementing INAE Guidelines on the functioning of the Forum's.

For giving impetus to the time-bound MTRS on Lessons from Landslides, a new Project Monitoring Committee was notified by the INAE because of the transfer of the Project from CRRI, New Delhi to IIT, Mumbai. At this stage a questionnaire was circulated on 8th February 2017 to solicit information and ideas from experts across the country. Based on the previous INAE investigation at Malin Gaon (done during the period January-June 2016), and literature review, the Backgrounder 1 on the project was finalised for peer- review. A progress review meeting was also held between Dr R.K.Bhandari, the PEI and Dr D N Singh FNAE, the coordinator from the host institute on 26th February 2017.

The PMC met for the second time at the DKRC on 27 February 2017 during which the MTRS was discussed in detail. At the meeting, it was decided to focus on two major case-studies, namely Malin Gaon Landslide disaster in Maharashtra and the Mapla landslide disaster in Uttarakhand. The PMC and the Forum were apprised of the shortcomings of the investigations done so far. The need for mapping of the post disaster changes in terrain, the current state of slope instability, drones photography were pointed out.

The matter was pursued by Dr D.N.Singh who sought the help of a local expert Dr Ashish Gharpure to cover-up the existing gaps and deficiencies in the study. The PEI pursued the matter and sought Dr Gharpure's assistance via his email of 21st March 2017. Dr D.N.Singh and Dr Gharpure jointly investigated Malin Gaon site on 30th and 31st March 2017.

The completion date of MRTS was revised to August 2018 because of the delay in starting the project.

Forum on “Indian Landscape of Advanced Structural Materials”

INAE Forum on Indian Landscape of Advanced Structural Materials has been constituted recently to focus on structural materials and study the Indian landscape of manufacturing capability, research and development capability and status of advanced structural materials compared to the rest of the world. This study is expected to highlight the gaps and point at necessary actions in our national structural materials landscape given the pull that will come from the burgeoning advanced components manufacturing over the next 10-15 years. The scope of the study will be limited to structural materials covering metals and alloys, structural polymers, cement, glass, composites and high temperature ceramics. The stakeholder coverage will include industry in each materials sector, industrial R&D, Government research laboratories, R&D laboratories of original equipment manufacturers such as automobiles, solar power generation, etc and academic institutes.

Dr Debashish Bhattacharjee, FNAE, Director Research, Development and Technology, Tata Steel Group, Tata Steel, Jamshedpur is the Chairman of the Forum. The Advisors of the Forum are Dr. Baldev Raj, Past-President, INAE & Director, National Institute of Advanced Studies (NIAS), Indian Institute of Science Campus (IISc), Bangalore; Dr Srikumar Banerjee, DAE-Homi Bhabha Chair Professor, Bhabha Atomic Research Centre (BARC), Trombay, Mumbai and Dr Dipankar Banerjee, Professor, Department of Materials Engineering, Indian Institute of Science (IISc), Bangalore. Prof Amol Gokhale, Indian Institute of Technology Bombay; Dr GK Dey, Head, Materials Science Division, Bhabha Atomic Research Centre, Trombay, Mumbai and Dr U Kamachi Mudali, Director, Materials Chemistry and Metal Fuel Cycle Group, Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam are the Joint Conveners of the forum. The Members of the Forum are Prof Indranil Manna, Vice-President, INAE & Director Indian Institute of

Technology Kanpur; Dr Kamachi Mudali, Dr GK Dey, Dr Soumitra Tarafder, Chief Scientist, CSIR-National Metallurgical Laboratory, Jamshedpur; Prof B.S. Murty, FNAE, Indian Institute of Technology Madras and Dr Tim Leverton, Tata Motors, Pune.

The forum has decided to bring out a report which shall be focussed on respective structural materials and sectors to highlight the gaps and therefore point at necessary actions in our national structural materials landscape for advanced components manufacturing over the next 10-15 years. The materials identified are Steel, Aluminium, Titanium, Magnesium, Polymer matrix composites, Ceramics, Glass and Super Alloys & High temperature Materials. Further, the sectors identified for the study are Automobile, Power, Constructions, Railways, Aerospace and Defence.



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

INAE Satish Dhawan Chair of Engineering Eminence has been instituted with the objective of enhancing the visibility of the Academy in the policy domain and establishing social connect. Eminent engineers who have contributed to some aspect of nation building are chosen for this esteemed position. The first Satish Dhawan Chairs were conferred on Dr. K Kasturirangan, FNAE, Formerly Chairman, Space Commission and Secretary, Department of Space, Bangalore; Formerly Director, National Institute of Advanced Studies, Bangalore and Formerly Member (Science), Planning Commission, New Delhi and Dr. Anil Kakodkar, FNAE, Formerly Director, BARC, Mumbai; Formerly Chairman, Atomic Energy Commission and Secretary, Department of Atomic Energy, Mumbai. The contributions by Dr K Kasturirangan during his tenure have resulted in a manuscript related to grand challenges in technology that India should pursue with well-defined institutional mechanisms. Dr Anil Kakodkar had undertaken the task on the topic “Sustainable Model for Technology Enabled Development in Rural Areas” a report is under preparation based on the findings of the study. Actions will be initiated for dissemination of the reports to the concerned policymakers/ Government agencies identified and the recommendations shall also be progressed to yield tangible results.

The INAE Governing Council during its meeting held on Dec 7, 2016 approved the recommendation of the Search-cum-Selection Committee of conferring the Satish Dhawan Chair for the year 2017 on Dr Kota Harinarayana, FNAE, formerly Programme Director, Aeronautical Development Agency (ADA) Bangalore. Dr Kota Harinarayan has since confirmed that he will undertake work on the topics as given below during his tenure as INAE Satish Dhawan Chair

- (1) Realization of aircraft for enhancing India’s regional air connectivity.
- (2) As design and development is a vital constituent of “Make in India “ programme, work shall be carried out in propagating Design discipline in Engineering in general and Aerospace engineering in particular.

Engineering Excellence Awards

Life Time Contribution Award in Engineering 2016

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.

During the year 2016, the Life Time Contribution Award in Engineering was conferred on:



Dr. PS Goel, Honorary Distinguished Professor, ISRO Hqrs. and Raja Ramanna Chair Visiting Professor, National Institute of Advanced Studies (NIAS), Bangalore. Dr. PS Goel was conferred the award in recognition of his outstanding contributions in the fields of Satellite Technology, Space Science.



Dr. VK Aatre, Formerly Scientific Adviser to Raksha Mantri, Ministry of Defence, New Delhi; Formerly Director, NPOL, Cochin, Former CC (R&D), DRDO, New Delhi. Dr. VK Aatre was awarded in recognition of his outstanding contributions in the fields of Electronics & Communication, Aeronautics Technology.

Prof. Jai Krishna and Prof. SN Mitra Memorial Award, 2016

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).



During the year 2016, Prof Jai Krishna and Professor SN Mitral Memorial Awards were conferred on:

Prof Jai Krishna Memorial Awardee



Dr. V Adimurthy, Honorary Distinguished Professor, ISRO, Vikram Sarabhai Space Centre, Thiruvananthapuram was conferred the Prof. Jai Krishna Memorial Award 2016 in recognition of his outstanding R&D efforts in the field of Aerodynamics, Multi-disciplinary design optimization.

Professor SN Mitra Memorial Awardee



Prof. VS Borkar, Department of Electrical Engineering, Indian Institute of Technology Bombay, Mumbai was conferred the Prof. SN Mitra Memorial Award 2016 in recognition of his fundamental contributions in Theory, algorithms and applications of stochastic optimization and control.

INAE Outstanding Teachers Award 2016

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

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

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

During the year 2016, INAE Outstanding Teachers Award was conferred on :



Prof. SK Sarangi, Director, National Institute of Technology, Rourkela. He was awarded in recognition of his outstanding contributions in Cryogenic Engineering and heat Transfer Equipment.



Prof Sri Niwas Singh, Department of Electrical Engineering, Indian Institute of Technology Kanpur were conferred the INAE Outstanding Teachers Award 2016. Prof Sri Niwas Singh was conferred the award in recognition of his outstanding contribution in the areas of Power Systems and Smart Grid.

INAE Young Engineer Awards, 2016

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, 208 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 2016 were sought from INAE Fellowship, Engineering institutions, R&D Labs. Out of 128 nominations, 33 were shortlisted by the Sectional Committees. The shortlisted candidates gave presentation of their work before the Selection Committee on Aug 18, 2016 at New Delhi.

The following ten candidates conferred INAE Young Engineer Award 2016.

- 1 Dr. Sudib Kumar Mishra, Assistant Professor, Department of Civil Engineering, IIT Kanpur.
- 2 Mr. N Suresh Kumar, Principal Member - Transmission R&D, Tractors and Farm Equipment Ltd. (TAFE), R&D Division, Chennai.
- 3 Dr. DV Pinjari, DST Inspire Faculty Fellow, Chemical Engineering Department, ICT, Mumbai.
- 4 Dr. Manisha B Padwal, Post Doctoral Fellow, Combustion Laboratory, Department of Aerospace Engineering, IIT Kanpur
- 5 Dr. Amartya Mukhopadhyay, Assistant Professor, Department of Metallurgical Engineering and Materials Science, IIT Bombay.
- 6 Ms. Harshita Tolani, Scientist/Engineer-SE, MSRD/MSTG/MRSA, SAC, ISRO, Ahmedabad.
- 7 Dr. Chandan Saha, Assistant Professor, Department of Computer Science and Automation, IISc, Bangalore.
- 8 Dr. Uday Kumar Reddy B, Assistant Professor, Department of CSA, IISc, Bangalore.
- 9 Dr. Santanu Kapat, Assistant Professor, Department of Electrical Engineering, IIT Kharagpur.
- 10 Dr. Sai Siva Gorthi, Assistant Professor, Department of Instrumentation and Applied Physics, IISc, Bangalore

Innovative Student Projects Awards, 2016

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 127 nominations received (35 at Doctoral level; 39 at Master's level and 53 at Bachelor level) were examined by the Selection Committee. Out of these, 49 nominations (17 at Doctoral level; 12 at Master's



level and 20 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 2016 as given below.

Doctoral Level

- 1 Dr (Ms) Sunitha K Nayar, Indian Institute of Technology, Madras (*Design of Fibre Reinforced Concrete Slabs-on-Grade and Pavements*)
- 2 Dr Ravinder Kumar Duvedi, Thapar Institute of Engineering & Technology University, Patiala (*Tool Positioning Algorithms for Improved Machining of Triangulated Surfaces*)
- 3 Dr Tanmoy Chakraborty, Indian Institute of Technology, Kharagpur (*Community Analysis in Large Networks: Methods and Applications*)
- 4 Dr Santanu Talukder, Indian Institute of Science, Bangalore (*Study and Control of Electromigration Driven Material Transport For Applications in Nanofabrication and Patterning*)
- 5 Dr Sasikumar P, Indian Institute of Technology, Madras (*Uncertainty Quantification and Reliability Analysis of Laminated Composite Structures with Spatial Random Inhomogeneities*)

Master's Level

- 1 Mr Sourav Sengupta, Indian Institute of Technology, Kharagpur (*Modelling of Non-solvent Induced Phase Separation during Membrane Casting*)
- 2 Mr Vibhor Pandhare, Indian Institute of Technology, Indore (*A Social Network For Machines – Realizing Industry 4.0*)
- 3 Mr Sandip Mondal, Indian Institute of Engineering Science and Technology, Shibpur (*Application of Biotechnology in Concrete*)
- 4 Mr Abhijit A Datta, Indian Institute of Technology, Bombay (*Design and Development of a novel 2.5 kVA Two-Stage Transformer-Less Grid-Tied PV System Based on SiC Devices with Emergency Battery-Backup*)
- 5 Ms Chandreyee Sarkar, Institute of Radio Physics and Electronics, University of Calcutta (*Engineered Ground Plane for Dielectric Resonator Antenna to Resolve an issue of Practical Mount*)

Bachelor Level

- 1 Agarshna Murari M, Karthik G., Balachandar R. and Ashwin Nambi, Sri Venkateswara College of Engineering, Sriperumbudur (*Design and Fabrication of a Pneumatically Actuated Exoskeleton for Sitting Posture to Reduce Labour Fatigue*)
- 2 Chiluka Soniya, Dandu Mukul Sri, Ravul Rikitha and V Jaydev Kumar, Mahatma Gandhi Institute of Technology, Hyderabad (*Design and Development of Prototype of an Android Based Agricultural Robot with Motorized Shovel Control System and Automatic Seed Dispensing System*)
- 3 Gaurav Mittal, Kaushal Yagnik and Mohit Garg, Indian Institute of Technology, Ropar (*SpotGarbage: Smartphone App to Detect Garbage Using Deep Learning*)
- 4 S. Anand Raj, P. Praveenkumar, S. Siva and B. Thangamariappan, National Engineering College, Kovilpatti (*Automatic Lifting System for Physically Challenged people to board the Indian trains*)
- 5 Kakanuru Sumithra, Indian Institute of Space Science and Technology, Thiruvananthapuram (*Integrated Algorithm for Tracking Using KCF and TLD and its Extensive Evaluation*)

Joint Schemes with AICTE

AICTE-INAE Distinguished Visiting Professorship Scheme

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, integrating their rich industrial experience with technical education. The Scheme has received very enthusiastic response from industry and engineering research institutions over the years.

The success of the scheme is largely attributed to active participation of experts from renowned industries like TATA Steel, Hewlett Packard, Larsen and Toubro Limited, Bharat Heavy Electricals Limited, 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 from engineering colleges/institutions associated with this scheme.

MoU of the scheme was due with renewal from 2015 and was renewed during 2016 between INAE and AICTE for five years with effect from 2015.

The Steering Committee during its meeting in the year 2016-17 selected the following eight industry experts:

1. Mr. Surendra M Vaidya
Executive Vice President and Business Head, Godrej & Boyce Mfg. Co. Ltd.
2. Mr. Nawal Kishore Gupta
Former Deputy Director LPSC/ISRO
3. Dr. Atmakur Venugopal Rao
Scientist 'F', Head Modelling and Simulation Group, Defence Metallurgical Research Laboratory, DRDO
4. Mr. Kezar Ali Shah
General Manager(Environment), Wonder Cement Ltd.
5. Dr. Vithal Narasinha Kamat
Managing Director, Baroda Electric Meters Ltd.
6. Mr. M. Muthukrishnan
General Manager-R&D and Coal Research, BHEL



7. Dr. T Venugopalan
Technical Advisor to MD, Tata Steel
8. Dr. PV Sivaprasad
Senior Expert, Group R&D, Sandvik Asia Pvt. Ltd

The Steering Committee also approved the extension of existing 21 Industry Experts for one year.

AICTE-INAE Teachers Research Fellowship

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. 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 organization of CSIR, DRDO, DOS and DAE.

An AICTE-INAE Programmes Committee with INAE Fellows and reps from AICTE, INAE, CII, CSIR, DRDO, DOS and DAE has been constituted to take decisions on applications and further recommend them to the strategic labs.

The MoU was renewed in Dec, 2016 wherein the guidelines for operation and implementation of the AICTE-INAE TRF Scheme prepared by the Committee were approved by AICTE. Maximum number of seats which could be offered by the laboratories under the proposed scheme during this academic session has been intimated by CSIR/DRDO/DOS/DAE.

The scheme this year was promoted effectively by INAE. AICTE also promoted the scheme through advertisement in print media and sending mails to Principals of engineering colleges. QIP portal had also announced this scheme as an alternate to their scheme.

28 applications were received during 2016-2017 from eligible engineering teachers to pursue the PhD programme and were scrutinized by the Committee. 10 suitable candidates were recommended to CSIR/DRDO/DOS/DAE for allocation of a lab and guide. The respective labs will follow their own selection procedure before offering admission to the selected candidate in the concerned lab.

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 pre final and final year graduate and post graduate engineering students to present papers abroad. The objective of the scheme is to encourage engineering students for doing research.

A Selection Committee comprising of different engineering sections of INAE has been constituted for evaluating the eligibility of a candidate to get the travel assistance under the scheme.

Reimbursement of 100% Registration Fee, 100% Visa fee, 50% of the actual Airfare of Economy Class from Air India and actual fare not exceeding AC II Class train fare is 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.

Renewal of MoU for the scheme between INAE and AICTE which was due for sometime was done in Dec, 2016.

The Scheme was promoted by INAE by sending mails to academicians and colleges. AICTE has also promoted the scheme effectively through print media and sending mails to Principals of AICTE approved Engineering colleges.

The scheme was non operational from Oct 2015 and was resumed from Dec 2016. Four candidates have been selected under the scheme since Dec 2016.

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 third/fourth year B.E./B.Tech; first/second year M.E./M.Tech; or fourth/fifth year Integrated M.Tech Level engineering students from IITs, IISc, NITs, IIITs and other Universities which are not approved by AICTE in order to encourage engineering students to engage in research.

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 to evaluate the eligibility of an applicant for getting the travel assistance. The scheme is running quite satisfactorily.

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

During the year 2016-17, seventeen candidates were selected under this scheme.



National Competition on Innovations in Manufacturing Practices - 2017 (IMP-2017)

Innovation in Manufacturing Practices (IMP) is an industrial design event organized annually by Indian Institute of Technology Kanpur in collaboration with Indian National Academy of Engineering (INAE) during Techkriti with the aim of providing bright minds a platform to display their talent in design and manufacturing. In this event, the participants are expected to design an effective and innovative model and give a final working shape as a prototype. The objective of the competition is to create interest and awareness about modern manufacturing processes; promote innovation and entrepreneurship amongst engineering students and select and award outstanding entries with attractive prizes and commendation. The event primarily offers a platform to enable engineering students both at undergraduate and postgraduate level to compete in an “All India Contest” to showcase their innovative ideas concerning manufacturing practices and display noble products. The subjects covered were Mechanical Sciences; Chemical Sciences and Electrical Sciences. This year, IIT Kanpur, INAE along with the INAE Kanpur Local Chapter, organized the national level competition on “Innovation in Manufacturing Practices 2017” (IMP-2017) on March 24, 2017.

After finalizing the competition structure, it was hosted online on the website of Techkriti (www.techkriti.org). The publicity of this competition then begun and it was publicized through digital, social and print media. IMP'17 has also been included in the fifth Inter IIT Tech Meet which was held in IIT Kanpur. Invitation mails were sent to around 900 different Universities and colleges comprising of IITs and NITs. Posters and Banners had been circulated to around 400 campus ambassadors from different universities all across India. In this competition, participants are required to present a working model / prototype which would be judged on various parameters such as innovation, fabrication, cost effectiveness etc., Participants are required to submit a report in not more than 300 words describing their project. They are also required to submit video demonstration of their working prototype/model. Selected teams were then invited to IIT Kanpur during Techkriti'17. A total of 16 teams were shortlisted this year.

Prof. Janakaranjan Ramkumar from Department of Mechanical Engineering, IIT Kanpur was the Convener for IMP'17. Prof. Vijay Prasad Dimri was invited as the chief guest for IMP'17. Prof. Dimri is an Indian geophysical scientist, known for his contributions in opening up a new research area in Earth sciences by establishing a parallelism between deconvolution and inversion, the two-vital geophysical signal processing tools deployed in minerals and oil and gas exploration.



Prof. Vijay Prasad Dimri lighting the lamp along with Prof. Indranil Manna, Director, IIT Kanpur

IMP'17 started with lighting of the lamp. Student coordinator for IMP welcomed the chief guest and participants giving a brief note on the journey of IMP'17. There was also an inspirational speech by Prof. Indranil Manna, Director of IIT Kanpur and Chief patron of IMP, in which he spoke about the current day issues pertaining to engineering in India. He emphasized on the fact that unconventional and innovative thinking is the need of the hour, thus motivating them. Followed by this, there was a talk by Prof. Dimri in which he shed light on the current scenario of the research and happenings in the field of Earth Science.



Prof. Indranil Manna, Director, IIT Kanpur delivering his Address



The projects were judged by a panel of professors from IIT Kanpur comprising of the following members:-

1. Prof. Shashi Shekhar Mishra from IME Department
2. Prof. Faiz Hamid from IME Department
3. Prof. Shashank Shekhar from Department of Material Science and Engineering

These projects were evaluated on the basis of various parameters such as innovation, fabrication, cost effectiveness etc. Its usefulness to the society, and also the scenarios of current Industrial situation were also taken into account. The teams which have bagged the prizes are :-

1. **Team Inventors:-** A three membered team who have designed a Mechanically Actuated Garbage Compacter. The product is a trash-can capable of reducing regular municipal, residential and commercial garbage to less than one-third of its volume.
2. **Team Itachi:-** The team has demonstrated the design of a novel remote controlled boomerang (UAV) that was able to hover like a normal VTOL and follow the determined circular trajectory. The vehicle consists of two rotor blades which are fabricated by the team with materials like glass fibre, carbon fibre and pink foam. It is propelled by a brushless motor, which causes the rotating motion which generates lift over the rotor blades.
3. **Team GBats :-** The team designed a model of a flapping wing flying vehicle (ornithopter), with a folding mechanism incorporated in it. The concept of this folding wing is a novel design which has lesser mechanical parts and mimics the wing kinematics of a real bat. The advantage of folding mechanism is to reduce the wing area during upstroke to decrease the upstroke effort.

The Green Team was given a special prize of appreciation for their contribution towards environmental ecology. They developed a practical approach to realize a green factory. The relation between process variables with energy consumption, waste reduction, and worker environment were described and a virtual green factory was established. This product could act as a guideline for systematic analysis of manufacturing facilities along with its unit processes for sustainability for posterity.

IMP'17 provided a platform not only to showcase one's products but also to explore and understand latest technologies and innovations brought up by other teams as well, hence leading to exchange of ideas.

Events Organized by Local Chapters

INAE Kolkata Local Chapter

Celebration of Science Day

INAE-Kolkata Chapter has celebrated 'Science Day' on 29th February 2016. Prof. Sankar K. Pal, FNAE presided over the meeting. On this occasion, the seminar lectures were organized by INAE-Kolkata Local Chapter in collaboration with the Center for Soft Computing Research, Indian Statistical Institute. A large number of students, researchers and Faculty members of Indian Statistical Institute including the Fellows of INAE attended the meeting. The details of the lectures organized are as under.

(i) ***Seminar Lecture on “Modeling the dynamics of brain activity at the meso-scale”***

The Seminar Lecture on Modeling the dynamics of brain activity at the meso-scale was delivered by Prof. Sitabhra Sinha, Institute of Mathematical Sciences, Chennai on May 20, 2016. The seminar lecture was organized by INAE-Kolkata Chapter on May 20, 2016. The Abstract of the Seminar Lecture is as under.

Abstract: Nonlinear dynamics of interactions between clusters of neurons via complex networks lie at the base of all brain activity. How such communication between brain regions gives rise to the rich behavioral repertoire of the organism has been a long-standing question. In this talk, we will explore this question by looking at the simulations of collective dynamics of a detailed network of cortical areas in the Macaque brain recently compiled from the CoCoMac database, as well as, a model of global coupled brain regions used as a benchmark. To understand the large-scale dynamics of the brain, we simulate it at the mesoscopic level with each node representing a local region of cortex, comprising between 10^3 - 10^6 neurons. The dynamical behavior of each such region has been described using a phenomenological model consisting of a pool of excitatory neurons coupled to a pool of inhibitory neurons, which exhibits oscillations over a large range of parameter values. Coupling these regions according to the Macaque cortical network produces activation patterns strikingly similar to those observed in recordings from the brain. Our results help to connect recent experimental findings of the olfactory system and suggest that a part of the complicated activity patterns seen in the brain may be explained even without a full knowledge of its wiring diagram.

Celebrations of 'Engineers Day'

INAE-Kolkata Chapter has celebrated 'Engineers' Day' on 15th September 2016. Prof. Sankar K. Pal, FNAE presided over the meeting. A seminar lecture was arranged in connection to this in collaboration with the Center for Soft Computing Research, Indian Statistical Institute. A large number of students, researchers and Faculty members of Indian Statistical Institute including the Fellows of INAE attended the meeting.



(i) Seminar Lecture on “Solid Oxide Fuel Cell: An Alternate Source of Power Generation”

On the occasion of ‘Engineers Day’, the Seminar Lecture on “Solid Oxide Fuel Cell: An Alternate Source of Power Generation” was delivered by Dr. Rajendra N. Basu, FNAE, Chief Scientist, CSIR-Central Glass & Ceramic Research Institute, Kolkata on September 15, 2016 at CSCR Meeting Room. The Abstract of the seminar lecture is as under.

Abstract: Solid Oxide Fuel Cell (SOFC) has emerged as one of the potential sources of energy generation because of its ability to produce electricity with high energy efficiency ($> 50\%$) and environmental friendly way (no air or sound pollution). The SOFCs are also advantageous because of its high temperature operation (above 700°C), use of special steel/alloy as interconnect/gas-manifold and acceptance of large number of fuels (hydrogen, natural gas and light hydrocarbons). SOFC is capable in producing electricity from kW to MW level and has shown its reliability by producing uninterrupted electrical power for several years of operation. Between the conventional tubular and planar designs, planar design is the most popular one and developing worldwide towards commercialization or mass production utilizing natural gas and air as the fuel feed and oxidant respectively. Among the several planar designs anode-supported SOFC is considered as the most simple and convenient way of fabrication which involves several innovative processes for fabrication. In this presentation, emphasis will be given to introduce some of novel techniques of material preparation, fabrication and practical operation to produce large power (in the form of a SOFC stack). The materials used for this investigation are 8 mol% yttria stabilized ZrO_2 (YSZ) and 20 mol% Gd-doped CeO_2 (GDC) as electrolytes; LaMnO_3 and La-Sr-Co-Fe (LSCF) as cathodes and Nickel-YSZ/GDC as the anode material. These cells are characterized to test their electrochemical performances in the operating temperature range between 700°C and 800°C . Several indigenous SOFC stacks have been fabricated in our laboratory and operated for several months at temperature 800°C using these indigenous SOFC single cells, high temperature sealant and field flow design. An overview on the high temperature fuel cell activities of the lab and the role of innovations during the SOFC processing would be highlighted.

INAE Mumbai Local Chapter

As a follow up of joint collaborative programmes between INAE and the Canadian Academy of Engineering (CAE) on Clean Coal technologies, the INAE Mumbai Local Chapter in association with Indian Institute of Chemical Engineers Mumbai Regional Centre had organized a joint Seminar on “Circulating Fluidized Bed Combustion: Problems & Prospects” on 20th May, 2016 at Victor Menezes Convention Centre (VMCC) IIT Bombay Powai, Mumbai. Experts from Canada participated in the Seminar. The objective of the seminar was to review the performance of Indian CFBC units and to suggest improvement options. The Seminar offered a platform for various stake holders in the field - policy makers and regulators, designers and manufacturer, operators and practicing engineers from user industries, academicians, etc. in the Electric Power industry to come together and to deliberate, interact and suggest future options and specific actions for the country to be adopted. The lectures delivered by distinguished speakers from international as well as speakers from Industries in India delved into detail of advances in CFBC technology and experiences of user industries, problems being faced in its operation and measures to be adopted to overcome them. Dr. Prabir Basu, President of Greenfield Research Incorporated, Canada delivered the plenary lecture. A Panel Discussion was held and the recommendations of the workshop to be submitted to the concerned agencies were arrived at.

INAE Kanpur Local Chapter

The following new Executive Committee has been constituted for the years 2017 and 2018.

Prof. K. Muralidhar, Mech. Eng. Dept. IIT Kanpur	- Chairperson
Prof. Yogesh M. Joshi, Chem. Eng. Dept. IIT Kanpur	- Vice Chairperson
Prof. Kantesh Balani, MSE Dept. IIT Kanpur	- Hon. Secretary
Prof. S.N. Singh, Electrical Eng. Dept. IIT Kanpur	- Member
Prof. Mukesh Sharma, Civil Eng. Dept. IIT Kanpur	- Member

INAE Delhi Local Chapter

INAE Delhi Local Chapter which had been dormant for a long time has since been activated under the Chairmanship of Prof. V Ramgopal Rao, Fellow of INAE and Director, IIT Delhi. The Chairman has also constituted an Executive Committee for planning/undertaking activities. The meeting of the Executive Committee members was held and decided to nominate the following Fellows as Office Bearers of INAE Delhi Local Chapter.

Chairman	- Prof. V. Ramgopal Rao, FNAE
Vice-Chairman	- Mr. Pradeep Chaturvedi, FNAE
Secretary & Treasurer	- Prof. G. Bhuvaneshwari, FNAE

As a first activity of the INAE Delhi Local Chapter, a lecture on “Navigating Complexity by Common Sense: Some Personal Lessons” by Prof. Ashutosh Sharma, Secretary, DST has been planned jointly with IIT Delhi wherein all Fellows of INAE to be invited.

The Abstract of the lecture on “Navigating Complexity by Common Sense: Some Personal Lessons” by Prof. Ashutosh Sharma is given below.

Abstract

In this talk, we will explore some inter-related ideas about doing science and its translation to technology based on some impersonal lessons from my personal voyages in nanoscience and nature inspired technologies. The talk will be at a level accessible to a non-specialist, emphasizing the central role of ideas and scientific common sense even in the cutting-edge science, rather than an exclusive reliance on expensive state-of-art infrastructure alone. Examples will be from some of our work on self-assembly and self-organization in soft materials by control of instabilities. The basic principles will be illustrated by some select examples from self-organization of thin (5 nm-100 nm) liquid and solid films, electric field modulation of interfaces and directed electrospinning.

The talk will also interweave some oncoming challenges, opportunities and directions in S&T research and a few selected new DST programs that address the gaps in our S&T and innovation ecosystems. This part will also briefly introduce an assortment of concepts such as Academic Social Responsibility, Grass-roots Innovations, Convergence and Co-arising of Technologies, Gender and Diversity in Science, Rise of Machines in Industry 4.0 and maybe even that eternal debate on ‘basic’ vs ‘applied’! The idea is not to arrive at a final view on any of these multi-faceted notions, but to encourage awareness and debate.



INAE Bangalore Local Chapter

During the current year, INAE Bangalore Local Chapter which was dormant since long has been activated due to the initiative of Prof. BVA Rao, a Fellow of INAE.

During the month of September 2016, a formal meeting for election of the Office Bearers of the INAE Bangalore Local Chapter was held at CSA Conference Room, Indian Institute of Science, Bangalore. The following Fellows were elected as Office Bearers of INAE Bangalore Local Chapter for the period 2016-18.

Chairman	-	Dr. VK Aatre
Secretary	-	Dr. AR Upadhya
Treasurer	-	Dr. V Bhujanga Rao

Since then the INAE Bangalore Local Chapter is meeting regularly and has undertaken a number of activities. Some of the activities undertaken by the INAE Bangalore Local Chapter during the current year are as under.

(a) *INAE-SIATI Seminar on “Innovations in Technologies, Processes, Machine Tools and Quality Control for Manufacturing Excellence”*

The INAE-SIATI joint Seminar on “Innovations in Technologies, Processes, Machine Tools and Quality Control for Manufacturing Excellence” was held on Dec 2-3, 2016 at HAL, Bangalore. Shri AS Kiran Kumar, Secretary, Department of Space and Chairman ISRO was the Chief Guest. Dr BN Suresh, President, INAE and Shri Kaveri Renganathan, CEO, HAL, Bangalore were the Guests of Honour. The format of the seminar included five Technical Sessions, an “Academy Industry Interaction workshop” and a Panel Discussion on “National Manufacturing Policy and Development Funds for Innovations in Manufacturing”.

(b) *INAE-NAEK Workshop on High Temperature Materials (Hotel Movenpick, Bangalore; 16-17 March 2017)*

The two and half day joint Workshop between Indian National Academy of Engineering (INAE) and National Academy of Engineering of Korea (NAEK) on “High Temperature Materials” was held on March 16-17, 2017 at Indian Institute of Science, Bangalore. The workshop was inaugurated by Dr. V.K. Aatre, Chairman, INAE Bangalore Local Chapter and former Scientific Advisor to the Defence Minister and Secretary, Department of Defence Research and Director General, Defence Research and Development Organisation. The workshop was attended by 11 participants from the Republic of Korea, with 7 talks on various topics, and 20 participants from India with 13 talks. The programme covered the current and future directions in high temperature materials ranging from high temperature alloys & polymer matrix composites to and ultra high temperature composites, as envisaged by the Indian and Korean participants.

(c) *National Conference on “Emerging Technologies & Applications of Small UAVs”*

INAE Bangalore Local Chapter organized jointly with Jain University & Karnataka Knowledge Commission a National Conference on “Emerging Technologies & Applications of Small UAVs” on March 22-23, 2017 at Bangalore. The Conference aimed to bring together leading scientists and engineers from laboratories and industries and research scholars from academia and experts

from regulatory bodies and the application experts from various departments to exchange and share their experiences and research results on all aspects of UAVs. The Conference was inaugurated by Dr. CG Krishnadas Nair, FNAE, Chancellor, Jain University Honorary, President, Society of Indian Aerospace Technologies & Industries (SIATI). The Pre-conference Workshop on “Autonomous UAV – Design, Development and Autopilot Integration, Ground Control Operations and Payload Analysis” was organized for students and practicing engineers on 21st March 2017. The technical talks focusing on eminent personalities in the areas of advanced designs, communication systems, payloads, ground controls and safety regulations and certification were delivered by eminent experts in various sessions on both days. In addition, Mission mode field demonstration relevant to survey, agriculture, disaster management etc. and Static exhibits of payload sensors, subsystems and aerial vehicles and video shows were also form part of the event. There was a Panel discussion on the academic courses, development strategy, safety and regulations.

(d) *Outreach Programmes with local Engineering Institutions*

(i) Outreach Programme at PES University:

The Programme at PES University, jointly with Crucible of Research & Innovation(CORI), PESU was held on 8th Feb 2017, centered around a lecture on ‘Applications of Space Technology for Common Man’ by Dr P G Diwakar, ISRO. Dr TK Alex presided over the function. There was also a short presentation on Development of Nano Satellite PISAT at PESU, followed by interaction with faculty & students. Vice Chancellor and Director-CORI, PESU were present.

(ii) Outreach Programme at MSRIT:

A Half Day Outreach Programme on Noise Pollution and its Control was conducted at MSRIT on 25.2.2017 with lectures by Prof Munjal, Dr BVA Rao and Dr Bhujanga Rao. Dr VK Aatre and Principal, MSRIT were present. Faculty, PG students and senior UG students from the Dept. of Mechanical Engineering attended.



International Affairs

CAETS 2016 Annual Meeting and Engineering a Better World Conference

CAETS 2016 Annual Meeting and Engineering a Better World Conference was hosted by Royal Academy of Engineering, UK on Sept 12-16, 2016 at London. INAE delegation led by Dr BN Suresh, President, INAE participated in the event. The CAETS Board of Directors and the Executive Committee meetings were held on the first day wherein Dr. Baldev Raj, Immediate Past President, INAE; Past President, CAETS and Chairman CAETS Energy Committee participated. During these meetings, the Agenda related to the CAETS events including budgetary requirements were discussed. On the same day, immediately after the above meetings, the CAETS Energy Committee meeting was held under the Chairmanship of Dr. Baldev Raj, Immediate Past President, INAE; Past President, CAETS and Chairman CAETS Energy Committee. During this meeting, the CAETS Energy Committee Report on “Transitioning To Lower Carbon Economy : Technological and Engineering Considerations in Building and Transportation Sectors” compiled by INAE was released. The members of the CAETS Energy Committee appreciated the efforts of the Chairman and the INAE in compilation of this Report. During this meeting, the likely topics for taking up further by CAETS Energy Committee were also discussed. It was decided, during the meeting, that Prof. John Loughhead, The Royal Academy of Engineering was requested to finalize the topic to be taken up by the CAETS Energy Committee.

The CAETS Convocation on “The Engineering a Better World” was held on Sept 13-14, 2016 wherein Dr. Ameenah Gurib Fakim, President of Mauritius was the Chief Guest. A number of eminent experts to include speakers from the Member Academies of CAETS participated and presented papers on various themes of the Convocation. Dr BN Suresh, President, INAE delivered a talk on “The Academy as a Fellowship” during the Session on “What Role do Academies of Engineering play in the life of a country, and why are they needed?”. Subsequently, on September 15, 2016, the CAETS Governing Council meeting was held and one of the topics discussed was “Diversity”. Dr Kamachi Mudali, FNAE made a brief presentation on behalf of INAE during this session.

On the sidelines of CAETS Convocation, a number of meetings were held between INAE and the Member Academies of CAETS to explore the feasibility of conducting the joint activities of mutual benefit to the countries. During the CAETS Convocation, the following two events to be held in India during the year 2016-2017 were finalized.

- (a) INAE-Australian Academy of Technological Sciences and Engineering (ATSE) Sustainable Urban Water Management Workshop to be hosted by IIT Jodhpur.
- (b) INAE-National Academy of Engineering Korea (NAEK) Joint Workshop on “High Temperature Materials to be held at Indian Bangalore.

The Fellowship

The selection process for election to the Fellowship was reviewed and modified wherein two stage selection process had been introduced. The comments from the Fellowship on the nominations received are also obtained prior to the first meeting of the Sectional Committees. In the first stage, the nominations are initially shortlisted to seek peer review reports from the recommended Fellows/domain experts. In the second stage, the peer review reports received are considered by the Sectional Committees to recommend nominations for election to the Fellowship for approval of the Governing Council. The following were elected as Fellows of the Academy w.e.f. Nov 1, 2016.

Fellows elected under Rule 37(g)

The intake of Election of eminent experts as Fellows under Rule 37(g) was increased from thirty to forty since there are only 19% of Fellows on the rolls of the Academy from the category of “Industry” and many eminent experts from the Industry who have excelled in their respective spheres are not nominated for election to the Fellowship through the normal process. It was unanimously decided that not more than five exceptional eminent persons will be elected under this Rule in a year. Accordingly, five eminent engineering luminaries from Industry elected under Rule 37(g) were.



- 1 Mr. Sajjan Jindal, Chairman, JSW Group, JSW Steel Ltd., JSW Centre, Mumbai.



- 2 Mr. T. V. Narendran, Managing Director, Tata Steel India & South East, Asia, Tata Steel, Jamshedpur, Jharkhand.



- 3 Mr. Sushil Kumar Soonee, Chief Executive Officer, POSOCO, New Delhi.



- 4 Mr. T. Suvarna Raju, Chairman & Managing Director, Hindustan Aeronautics Ltd., Bangalore.



- 5 Mr. Senapathy “Kris” Gopalakrishnan, Co-founder Infosys & Chairman Axilor Ventures, Bangalore.

Newly Elected Fellows

Engineering Section-I



- 1 Prof. Baidurya Bhattacharya, Professor, Department of Civil Engineering, Indian Institute of Technology Kharagpur.

Engineering Section-II



- 1 Prof. Sukumar Nandi, Professor, Computer Science and Engineering and Head Centre for Linguistic Science and Technology, Department of Computer Science and Engineering, Indian Institute of Technology Guwahati, Guwahati, Assam



- 2 Prof. PJ Narayanan, Professor and Director, CVIT, Hyderabad.



- 3 Dr. Hariharan Ramesh, Chief Technology Officer & Adjunct Professor, Strand Life Sciences, Bangalore



- 4 Mr. Vinay V. Kulkarni, Chief Scientist, Tata Research Development and Design Centre, Tata Consultancy Services Research, Pune.

Engineering Section-III



- 1 Prof. B. Ravi, Institute Chair Professor, Mechanical Engineering Department, Indian Institute of Technology Bombay, Mumbai.



- 2 Dr. Saptarshi Basu, Associate Professor, Department of Mechanical Engineering, Indian Institute of Science, Bangalore.



- 3 Dr. C Ranganayakulu, Scientist 'H'/Outstanding Scientist (OS) and Group Director (ECS), Aeronautical Development Agency (ADA), Bangalore.



- 4 Mr. NM Dube, Managing Director, Ducom Instruments Pvt. Ltd., Bangalore.

Engineering Section-IV



- 1 Prof. JB Joshi, Emeritus Professor, Homi Bhabha National Institute, Mumbai.



- 2 Prof. Yogesh M Joshi, C.V. Seshadri Chair Professor, Department of Chemical Engineering, Indian Institute of Technology Kanpur.



- 3 Dr. Uday Shankar Agarwal, President (R&D), Grasim Industries Limited.



- 4 Mr. Ajay Narayan Deshpande, Director (Technical), Engineers India Limited, New Delhi.

Engineering Section-V



- 1 Prof. BG Fernandes, Professor & Head, Department of Electrical Engineering, Indian Institute of Technology Bombay, Mumbai.



- 2 Prof. Ramanujam Sarathi, Professor, Department of Electrical Engineering, Indian Institute of Technology Madras, Chennai.

Engineering Section-VI



- 1 Prof. KVS Hari, Professor & Chairman, Department of ECE, Indian Institute of Science, Bangalore



- 2 Dr. Swades De, Associate Professor, Department of Electrical Engineering, Indian Institute of Technology Delhi.



- 3 Dr. R Muralidharan, Emeritus Professor, Centre for Nanoscience and Engineering (CENSE), Indian Institute of Science, Bangalore.



- 4 Dr. Mahesh Mehendale, MCU Chief Technologist and Director, Texas Instruments (India) Ltd., Bangalore.

Engineering Section-VII



- 1 Dr. PP Mohan Lal, Prof. Satish Dhawan Professor, Indian Institute of Space Science & Technology (IIST), Trivandrum.



- 2 Mr. BHVS Narayana Murthy, Director, Research Centre Imarat (RCI), Hyderabad

Engineering Section-VIII



- 1 Prof. Rahul Mitra, Professor, Department of Metallurgical and Materials Engineering, Indian Institute of Technology, Kharagpur.



- 2 Prof. DC Panigrahi, Director, Indian Institute of Technology, (Indian School of Mines), Dhanbad, Jharkhand.



- 3 Dr. Ashim Kumar Mukhopadhyay, Outstanding Scientist and Associate Director, Defence Metallurgical Research Laboratory Hyderabad



- 4 Dr. DK Likhi, Chairman & Managing Director, Mishra Dhatu Nigam Limited (MIDHANI), Hyderabad.

Engineering Section-IX



- 1 Prof. Chandra Venkataraman, Professor of Chemical Engineering & Convener, Interdisciplinary Programme in Climate Studies, Department of Chemical Engineering, Indian Institute of Technology Bombay, Mumbai



- 2 Mr. Vivek Bhasin, Associate Director, Nuclear Fuels Group (NFG), RLG, Bhabha Atomic Research Centre (BARC), Mumbai.

Engineering Section-X



- 1 Prof. NS Raghuwanshi, Professor, Agricultural & Food Engineering Department, Indian Institute of Technology Kharagpur



- 2 Prof. Sampath Srinivasan, Professor, Department of Inorganic and Physical Chemistry, Indian Institute of Science, Bangalore.



- 3 Dr. Akhilesh Gupta, Adviser and Head, Climate Change Programme, SPLICE, Department of Science and Technology, Govt. of India, New Delhi.



- 4 Dr. GM Rao, Group Chairman, Group Chairman Office, DIAL, New Delhi

Newly elected Foreign Fellows



- 1 Dr. Rakesh Agrawal, Founder & President, Data Insights Laboratories, USA



- 2 Dr. Anil Kumar Jain, University Distinguished Professor, Department of Computer Science, Michigan State University, USA.



- 3 Prof. Robin John Batterham, Kernot Professor Engineering, Melbourne University, Australia.



- 4 Prof. B Jayant Baliga, Distinguished University Professor, Main Campus Drive, NCSU Centennial Campus, USA.



- 5 Prof. Cato T Laurencin, University Professor, University of Connecticut, USA.

Honours and Awards

Republic Day Award

The following INAE Fellows have been conferred with the prestigious award of Padma Vibhushan and Padma Shri on the occasion of the Republic Day on Jan 26, 2017.

Republic Day Awardee

Padma Vibhushan



- Dr. UR Rao, Chairman, PRL Council, Department of Space and Formerly Secretary, Department of Space; Chairman and Member Space Commission.

Padma Shri



- Mr. Chandrakant Pithawa, Raja Ramanna Fellow, BARC Camp at ECIL, Hyderabad and Formerly Distinguished Scientist and Director, E&I Group, Bhabha Atomic Research Centre, Mumbai

Other Awards

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

1.	Dr. BN Suresh, FNAE, Vikram Sarabhai Distinguished Professor, ISRO Headquarters, Bangalore and President, INAE was conferred the “Sir M Visweswariah Science Award” Sept. 17, 2016 for his outstanding contributions to Space science research and Education in the 12th Karnataka Science Congress held at Bidar, Karnataka, by the Karnataka Branch of “Vijnana Bharathi”, (Science India)
2.	Dr Baldev Raj, FNAE, Director, National Institute of Advanced Studies, Bangalore and formerly Distinguished Scientist and Director, IGCAR Kalpakkam and Formerly President-Research, PSG Institutions, Coimbatore was conferred the Jawaharlal Nehru Birth Centenary Award by Indian Science Congress Association, (ISCA), Bangalore Chapter. The award honours key individual for significant and lifetime contribution to the development of Science and Technology for the country and was announced during 104 th Indian Science Congress held at SV University, Tirupati on January 3, 2017. He also received the 20 th SIES Sri. Chandrasekarendra Saraswati National Eminence Award in the domain of S&T for serving the society for more than four decades by The South Indian Educational Society (SIES), Mumbai, on December 16, 2016. Dr Baldev Raj was also conferred the SASTRA-CNR Rao Award for Excellence in Chemistry & Materials Sciences, at SASTRA University, Thanjavur on February 28, 2017. He also received the Prof. T R Anantharaman Memorial Award on Metallurgy Day at the Department of Metallurgical Engineering, IIT-Banaras Hindu University, Varanasi. Dr Baldev Raj was also conferred the Lifetime Achievement Award, Indian Science Monitor & Indo Asian Foundation for Archaeological Research by Hon’ble Chief Justice M.N. Venkatachaliah.



3.	Dr RK Bhandari, FNAE, Formerly Director, Central Building Research Institute, Roorkee & Programme Director, UN-HABITAT, Nairobi and Formerly Chairman, Centre for Disaster Mitigation and Management, VIT, Vellore was conferred the Lifetime Achievement Award by the Quantum Global Campus, Uttarakhand on April 16, 2016 in recognition of his unparalleled journey of achievements and attainments.
4.	Dr CR Prasad, FNAE, former CMD, GAIL has received the Petrotech 2016 (Ministry of Petroleum & Natural Gas) Lifetime Achievement Award from the Hon'ble Finance Minister, Shri Arun Jaitley in Vigyan Bhavan, New Delhi in the presence of Mr. Dharmendra Pradhan, Minister of Petroleum & Natural Gas.
5.	Dr. Bhakta B. Rath, FNAE, FASM, Associate Director of Research; Head Materials Science & Technology Directorate; Naval Research Laboratory, Washington, DC is being conferred the Medal for the Advancement of Research by ASM International "For leadership in promoting basic research and advanced exploratory developments in multi-disciplinary fields of materials science and engineering and promoting technological innovation for commercial sector and for national security." The Award will be presented at ASM's Annual Awards Dinner on Oct 25, 2016 in Salt Lake City, UT, during Materials Science & Technology 2016 (MS&T '16).
6.	Dr TSR Prasada Rao, Chairman, Sarasi Jam Technologies, New Delhi and Formerly Director, Indian Institute of Petroleum, Dehradun was conferred the prestigious "Energy and Environment Foundation Global Excellence Award - 2016 in Petroleum Energy Sector" on 15th February 2016 at New Delhi, by Hon'ble Mr. Anil Razdan, Former Secretary Power, Government of India and Chairman Energy and Environment Foundation.
7.	Prof KA Natarajan, FNAE, Department of Materials Engineering, Indian Institute of Science Bangalore was conferred the NIGIS Lifetime Achievement Award by the NACE International Gateway India Section during CORCON 2016 Corrosion Conference and Expo held during Sept 18-21, 2016 at New Delhi.
8.	Prof A.K. Tripathy, FNAE, Senior Professor, Silicon Institute of Technology, Bhubaneswar has been awarded the 2016 prestigious Visvesvaraya award of Odisha Engineer' forum which was conferred on 15th Sept, 2016 - Engineer's day.
9.	Dr Venkata Narayana Padmanabhan, FNAE, Principal Researcher and Research Manager, Microsoft Research India, Bangalore and Prof Avinash Kumar Agarwal, FNAE, Poonam and Prabhu Goyal Endowed Chair, Department of Mechanical Engineering, Indian Institute of Technology (IIT) Kanpur were conferred the Shanti Swarup Bhatnagar Award for science and technology for the year 2016.
10.	Prof P Somasundaran, FNAE, La von Duddleson Krumb Professor, Columbia University; Director of Langmuir Centre for Colloids & Interfaces, and Director of the National Science Foundation Industry/University Cooperative Research Centre was conferred the Lifetime Achievement Award by International Engineering Congress during a Banquet in Quebec City in Canada on Sept 14, 2016.
11.	Cmde R B Verma (Retd), FNAE Advisor, Advisor, Industrial Consultancy and Sponsored Research, Indian Institute of Technology Madras, Chennai was awarded the Life Time Achievement Award by Society of Automotive Engineers (SAE) International, in February 2016.

12.	Prof K Bhanu Sankara Rao, FNAE, Ministry of Steel Chair Professor, Department of Metallurgical & Materials Engineering, Mahatma Gandhi Institute of Technology, Hyderabad has received Platinum Medal from the Indian Institute of Metals on Nov 14, 2016 at IIT Kanpur for his outstanding contributions to Metallurgical profession, research, materials development to fast reactors and contributions to the Indian Institute of Metals.
13.	Prof. TC Rao, FNAE formerly, Director, CSIR- Regional Research Laboratory, Bhopal was honoured as the 2016 University of Queensland International Alumnus of the Year. Prof Rao was the first international PhD student of mining engineering at the University of Queensland.

News of Fellows

1.	Dr Baldev Raj, FNAE, Director, National Institute of Advanced Studies, Bangalore and formerly Distinguished Scientist and Director, IGCAR Kalpakkam and Formerly President-Research, PSG Institutions, Coimbatore was conferred the Degree of Doctor of Science (Honoris Causa) for the outstanding contribution in the field of Science and Technology by Indian Institute of Engineering Science and Technology (IIST); An Institute created by Act of Parliament, Shibpur, March 4, 2017. Hon'ble Prime Minister of India & President Council of Scientific & Industrial Research (CSIR) has appointed Dr Baldev Raj as the Chancellor & Chairperson of the Board of Governors of the Academy of Scientific and Innovative Research (ACSIIR), CSIR, New Delhi, 2017. Dr Baldev Raj was appointed Chairman of the Eminent Apex Committee of Council of Scientific & Industrial Research (CSIR) to recommend transformations and improvements for meeting and enhancing the objectives of CSIR, 2017. Department of Science and Technology (DST) has appointed Dr Baldev Raj as Chairman of BRICS- Science & Technology Enterprise Partnership (BRICS-STEP) Working Group for the periods of 4 years, 2017. Dr Baldev Raj is Chairman, BRICS Experts Panel Committee on International Collaborations relating to Advanced Materials, Nanotechnology, Photonics, Astronomy and Astrophysics, 2017. He is also Chairman, Selection Committee for Selection of Indian Team for participation in 2nd BRICS Young Scientists Conclave to be hosted by China, Ministry of S&T, DST, Delhi. Dr Baldev Raj is Member of Confederation of Indian Industry (CII) National Committee on Higher Education (2014-18). He is Expert Member, Committee, NITI Aayog for framing S&T Vision for India. Dr Baldev Raj is Member, "Emerging scenario for Nano-Electronics" under Chairmanship of Dr R Chidambaram, PSA to GoI to take into view, the opinion of experts and stakeholders for the next phase of R&D efforts, including the maintenance of the excellence already achieved, industry interaction and develop a road-map in this important field, 2017.
2.	Prof Ganti Prasad Rao, President and CEO, Inventive Pathways-Management Consultancy, Abu Dhabi has edited two books under the CRC Book Series – "Engineering Systems and Sustainability" on "Multi - Stage Flash Desalination" and "Nonlinear Stochastic Control and Filtering" published by CRC Press.
3.	Prof Bimalendu B. Bhattacharya, FNAE, formerly INAE Distinguished Professor, Satyendra Nath Bose National Centre for Basic Sciences; Formerly Director Indian School of Mines, Dhanbad and Chairman, Research Council, CSIR-NGRI, Hyderabad has just brought out a book titled "Goelectric Methods: Theory and Applications" co-authored with Shalivahan and published by McGraw Hill Education.
4.	Dr V Ramachandran, FNAE, Emeritus Scientist, National Aerospace Laboratories, Bangalore has authored a book on "Failure Analysis of Engineering Structures: Methodology and Case Histories" published by ASM International.
5.	Prof. Amlan J. Pal, FNAE and Senior Professor, Indian Association for the Cultivation of Science, Kolkata was awarded with J C Bose Fellowship of DST, Government of India.
6.	Dr DR Prasada Raju, FNAE Professor of Mechanical Engineering and Dean, MVGR College of Engineering, Vizianagaram and R&D Adviser, IIT-Madras has been assigned the role of Member Secretary of Programme Review and Monitoring Committee of Dept of Heavy Industry (DHI), Govt of India. This Committee will oversee implementation of a few major projects, partly supported by Industry, in the area of Advanced Manufacturing Technology.

7.	Prof Mahesh Tandon, FNAE, Managing Director, Tandon Consultants Pvt Ltd, New Delhi has been invited by the Institution of Engineers (India) to deliver the first “Prof Jai Krishna Memorial Lecture” at the National Convention of Civil Engineers to be held at Goa on 21st Oct 2016.
8.	Shri Anil Anand, FNAE, Director Technical, Microtrol Sterilisation Services Pvt Ltd, Mumbai and Formerly Director (Reactor Projects Group), BARC, Mumbai has authored a book titled “Submarine Propulsion Muscle Power to Nuclear” which was released on Sept 18, 2016 at Mumbai.
9.	Prof. D N Singh, FNAE, Department of Civil Engineering, Indian Institute of Technology Bombay, Mumbai has recently been invited to become Fellow of the Institution of Civil Engineers (ICE), London, by a Presidential Invitation. He has also authored a book on Fly Ash Zeolites, Innovations, Applications, and Directions published by M/s Springer.
10.	Dr PA Lakshminarayanan, FNAE, Chief Technical Officer, Simpson and Co. Ltd., Chennai has recently published a paper on “A New Two Cylinder Diesel Engine Family for Off-road in Naturally Aspirated and Turbocharged Intercooled Versions” in SAE International about the new family of six engines developed by his team at Simpsons over six years with fifteen applications off-road.
11.	Prof R P Mohanty, FNAE, Senior Advisor - ICFAI Group has been selected for conferment of Honorary degree of Doctor of Science by Sambalpur University, Odisha which will be conferred in their Diamond Jubilee Convocation on 7th November, 2016.
12.	Prof. Dwijesh Kumar Dutta Majumder, FNAE, Professor Emeritus, Indian Statistical Institute, Kolkata presented the 21st Century Norbert Wiener Memorial Lecture on “Thinking Machines In The Physical World In The Context Of 21st Century” at IEEE 2016 Conference on Norbert Wiener in the 21st Century India Events on 13-15 July 2016 at Melbourne, Australia.
13.	Prof Ponisseril Somasundaran, FNAE, LaVon Duddleson Krumb Professor of Mineral Engineering at Columbia University has been elected Fellow of the National Academy of Inventors, USA.
14.	Prof SN Singh, FNAE, Department of Electrical Engineering, Indian Institute of Technology Kanpur has become IEEE Fellow w.e.f. 2017.
15.	Prof Debatosh Guha, FNAE, Institute of Radio Physics and Electronics, University of Calcutta, Kolkata has been elected IEEE Fellow this year.
16.	Prof Debabrata Das, FNAE, Department of Biotechnology, Indian Institute of Technology Kharagpur has co-authored a book on “Biohythane: Fuel for the Future” published by M/s. Pan Stanford Publishing Pte. Ltd, Singapore.
17.	The INAE report “Development of scientific recycling of end of life automobiles in India and the role of research and development”, commissioned by the Office of the Principal Scientific Advisor to Government of India, and prepared by Captain N S Mohanram, FNAE (Principal Investigator) has started impacting government policy in a desirable direction. Based on the recommendation of the report, the Government is planning to enact an environment friendly law. According to a news item published in Hindustan Times, “The Government will soon make it mandatory for automakers and their agents to buy old and unroadworthy vehicles, and recycle them.”

18.	Prof Bikramjit Basu, FNAE, Materials Research Centre, Indian Institute of Science, Bangalore has been elected as a Fellow of the American Institute for Medical and Biological Engineering (AIMBE). He was inducted during the AIMBE's 2017 Annual Event held on March 19-20, 2017 in Washington, DC, USA.
19.	The launch of the book by Capt NS Mohan Ram, FNAE , Adviser, TVS Motro Company Ltd, Hosur on his naval memoirs titled "My ships sailed the seas, but I stayed ashore" was covered in Hindu Saturday 10th February 2017 edition. The book was well received. The book is available from Amazon.com
20.	Shri DP Misra, FNAE, Director, Development Consultants Pvt Ltd & Adviser, Jindal Steel and Power Ltd, Mumbai presented a paper on Paper "Coal, the Potential Feed Stock for Indian Chemical Industry" during the World Clean Coal Conference-Refining & Petrochemicals World held on Jan 18-19, 2017 at New Delhi. The Paper highlighted various techniques of Coal Gasification and utilization of Synthesis Gas for manufacture of Methanol, Ethanol, Ethylene Glycol, Ammonia/ Urea, Substituted Natural Gas, Coal to Liquid and suggests recommendations for Govt of India and Private Sectors for immediate establishment of Commercial Gasifiers utilizing Indian High Ash Coal. Shri Misra also delivered a talk on Indian Chemical Industry on 25th January 2017 at Indian Institute of Technology Bombay, Mumbai.
21.	Prof. S.N. Mukhopadhyay, FNAE, Adjunct Professor, BITS Pilani has authored a book on Food Engineering: Process and Technology, Published by Viva Books, New Delhi, 2016.
22.	Dr Purnendu Ghosh, FNAE, Executive Director, Birla Institute of Scientific Research, Jaipur has authored a book on Looking into the Mirror, Published by Bodhi Prakashan, Jaipur

Fellows Deceased in Last one Year

During the year 2016-2017, it was learnt about the sad demise of the following INAE Fellows.

1. Dr KR Rajagopal, Professor, Department of Electrical Engineering, Indian Institute of Technology Delhi had made outstanding research contributions in the areas of Advanced Electrical Machines, Magnetic Devices and Finite Element Analysis of Electrical Machines.
2. Prof V Ramamurti, formerly Professor, Machine Dynamics Laboratory, Department of Applied Mechanics, IIT Madras had made outstanding contributions in the areas of Vibration and Stress Analysis.
3. Mr. P Ravindra Reddy, Director, MTAR Technologies Pvt. Ltd., Hyderabad had made significant contributions in the areas of Mechanical Engineering and Industrial Management.
4. Prof. J Nanda, INSA Honorary Scientist and Formerly Professor and Head, Department of Electrical Engineering, Indian Institute of Technology (IIT) Delhi had made outstanding contributions as an eminent educator, researcher and guide for students.
5. Prof Subhash Chandra Mishra, Department of Mechanical Engineering, Indian Institute of Technology Guwahati had made significant research contributions in the area of Heat Transfer.
6. Col SP Wahi Chairman, SP Wahi Management and Technology Consultants Pvt Ltd, Gurgaon and formerly Chairman, Oil & Natural Gas Commission had made outstanding contributions in the area of Petroleum Technology.
7. Dr Subrata Ganguly, Chairman, West Bengal Electronics Industry Development Corporation Ltd., Kolkata and formerly, Executive Vice Chairman, ACC Ltd was an outstanding leader in setting up a number of modern chemical industries in the country.
8. Prof. BN Das, INSA Senior Scientist, Department of Electronics & Electrical Communication Engineering, Indian Institute of Technology, Kharagpur had made significant research contributions in the fields of microwave and antenna engineering especially in developing the technique of fabrication of microwave magnetron.
9. Prof. Amalendu Mukherjee, of Department of Mechanical Engineering, Indian Institute of Technology Kharagpur had made significant research contributions in the areas of stabilization of high speed rotors, development of ball grinding process for manufacture of ball bearings, Thermo-metallurgical process for hot rolling of sheets and impedance control of robotic manipulators.
10. Mr. RK Jain, Former Chairman, Railway Board, New Delhi had made significant contributions in the area of Railway Project Management including development of Signaling and Telecommunications for Indian Railways and also for Railway Electrification Projects.
11. Prof BC Nakra, Formerly Professor, Indian Institute of Technology Delhi, NSIT & ITM University had made outstanding teaching and research contributions in the area of Vibration Analysis and Control including Noise Engineering Condition Monitoring.



INAE Annual Convention

The Annual Convention of the Indian National Academy of Engineering was held on Dec 8-9, 2016 at Satellite Applications Centre (SAC), Ahmedabad. A total of about 110 Fellows and 25 spouses attended the subject event. We also had the presence of three INAE Foreign Fellows, namely, Prof. Cato Thomas Laurencin, University Professor, University of Connecticut, USA, Prof. Subhash Mahajan, Distinguished Professor and Special Adviser to the Chancellor, University of California, USA and Prof. Suresh K Bhargava, Distinguished Professor, RMIT University, Australia, who happened to be in India during that period, attended the INAE Annual Convention. During the Inaugural Session on Dec 8, 2016, Mr. Shailendra N. Roy, Chief Executive & Whole-Time Director, Larsen & Toubro Ltd was the Chief Guest and Shri AS Kiran Kumar, Chairman, Space Commission, Chairman, ISRO and Secretary, Department of Space was the Guest of Honour. Mr. Tapan Misra, Director, Space Applications Centre delivered the Welcome Remarks. Dr BN Suresh, President, INAE delivered the Presidential Address and gave a brief overview of the activities of the Academy. This was followed by the Address by the Chief Guest, Mr. Shailendra N. Roy and the Guest of Honour, Shri AS Kiran Kumar.

The CAETS 2015 Proceedings published by M/s Springer which contains papers based on the presentations during the CAETS 2015 Convocation on “Pathways to Sustainability: Energy, Mobility and Healthcare Engineering” hosted by INAE at New Delhi on Oct 13-14, 2015; was released by Dr BN Suresh, President, INAE. Dr Purnendu Ghosh, Chief Editor of Publications, INAE gave a brief background of the CAETS Proceedings prior to the release.

After the Inaugural Session Award Lectures were presented by the INAE Lifetime Contribution in Engineering Awardees 2016 viz Dr. PS Goel, Honorary Distinguished Professor, ISRO Hqrs. and Raja Ramanna Chair Visiting Professor, National Institute of Advanced Studies, Bangalore and Formerly Secretary, Ministry of Earth Sciences and Dr. VK Aatre, formerly Scientific Adviser to the Raksha Mantri, Director General of Defence Research & Development Organization and Secretary Department of Defence R&D respectively. Dr PS Goel in his talk highlighted his experiences since he joined ISRO till his retirement and the challenges and opportunities that he came across in his professional journey. Dr VK Aatre in his lecture gave a brief overview of Micro Systems Technology in the country.

The major scientific and engineering highlights of the Convention were the presentations by newly elected Fellows and Young Engineer Awardees. The presentations were held in two Parallel Sessions on Dec 8-9, 2016. The list of the technical presentations by Fellows and Young Engineers are given below.

Presentations by Newly Elected Fellows on Dec 8-9, 2016

- | | |
|------------------------|---|
| ❖ Prof. B Ravi | - The Golden Spiral: Connecting Education, Research, Development and Application |
| ❖ Dr. C. Ranganayakulu | - Development of Environmental Control Systems and Compact Heat Exchangers for Aerospace Applications |
| ❖ Mr. NM Dube | - Extreme Tribology: Exploring Tribology testing for extremely Challenging Applications |
| ❖ Dr. Rahul Mitra | - Development of composite materials for light-weight and high temperature structural applications |

- ❖ Mr. Vinay V Kulkarni - Industrialization of Software Development
- ❖ Dr. Swades De - Protocols and Cross-Layer Optimizations for Green Communication Networks
- ❖ Mr. Vivek Bhasin - R&D in Structural Integrity of Nuclear Components: Large Amplitude Cyclic Loads
- ❖ Prof. PJ Narayanan - Recovering Three Dimensionality from Images
- ❖ Dr. US Agarwal - Innovating in bulk industry
- ❖ Prof. Baidurya Bhattacharya - Origins and Utility of Friction at small scales
- ❖ Prof. DC Panigrahi - Field investigations, modelling and simulation studies for reducing the radiation dose levels in underground uranium mines in India
- ❖ Dr. P.P. Mohanlal - Aerospace Inertial Sensors and Systems: Challenges
- ❖ Dr. Saptarshi Basu - Droplets, Sprays and Flow in combustors: Insights into different spatio-temporal scales
- ❖ Dr. Ashim Kumar Mukhopadhyay - Development and Industrial Scale Production of Structural Aluminium Alloys for Defence Applications
- ❖ Prof. KVS Hari - Experiments in MIMO Signal Processing
- ❖ Dr. R Muralidharan - Towards self reliance in high frequency devices
- ❖ Prof. NS Raghuwanshi - Improved Agricultural Water Management Using Information Technology
- ❖ Mr. BHVS Narayana Murthy - Missile Avionics : Design and Challenges
- ❖ Prof. Yogesh M Joshi - Revising a phase behavior of aqueous suspension of Laponite ®
- ❖ Prof. JB Joshi - Direct Numerical Simulation of Multiphase Systems : Applications to Flotation, Chromatographic Separation, Pyrolysis, Biomass Stove, Continuous Cooker, Technologies for CNT, Titanium and New Generation of Atomic Power Reactor
- ❖ Prof. BG Fernandes - Power Electronic based PV solutions for Rural India
- ❖ Prof. Chandra Venkataraman - Short Lived Climate Pollutants: Emissions and Impacts over India
- ❖ Prof. Sampath Srinivasan - Electrochemical Devices: Sensors and Energy Systems
- ❖ Dr. Hariharan Ramesh - Multi-disciplinary Engineering for Genomic Diagnosis

Presentations by INAE Young Engineer Awardees on Dec 8-9, 2016

- ❖ Mr. Suresh Kumar - Breakthrough development in agricultural tractor Clutch and Driveline systems
- ❖ Dr. Amartya Mukhopadhyay - Correlations between processing conditions, microstructure developments, dimensional aspects and phase transformations on the performance of engineering ceramics in advanced structural and electrochemical energy storage applications.



- | | |
|--------------------------|---|
| ❖ Dr. DV Pinjari | - Cavitation Technology: A Sustainable Technology for Environmental Cause |
| ❖ Dr. Santanu Kapat | - High-Performance, Energy-Efficient, EMI-Aware Mixed-Signal Dynamic Power Management Architectures |
| ❖ Dr. Sudib Kumar Mishra | - Seismic Vibration Control using Super-elastic Base Isolation |
| ❖ Dr. Manisha B. Padwal | - Atomization and Combustion of Gelled Propellants |
| ❖ Dr. Chandan Saha | - Arithmetic circuit complexity: Lower bounds, De-randomization and Reconstruction |
| ❖ Dr. Uday Kumar Reddy B | - Building Language and Compiler Technology for the Multicore Era |

Award Function on Dec 8, 2016

The Grand Award Ceremony was held on the evening of December 8, 2016. Five theses at Doctoral level, Five Theses at Master's Level and 5 Projects at Bachelor's Level were conferred the Innovative Student Projects Award. Ten candidates were conferred the INAE Young Engineer Award 2016.



Dr. Sunitha K Nayar being conferred the Innovative Student Projects Award 2016 at Doctoral level by Dr BN Suresh, President, INAE



Dr Chandan Saha being conferred the INAE Young Engineer Award 2016 by Dr BN Suresh President, INAE

Dr SN Singh, Professor, Department of Electrical Engineering, Indian Institute of Technology Kanpur and Prof SK Sarangi, Director, National Institute of Technology Rourkela were conferred the INAE Outstanding Teachers Award 2016.



Prof SN Singh receiving the Outstanding Teachers Award 2016 from Dr BN Suresh, President, INAE



Prof SK Sarangi receiving the Outstanding Teachers Award 2016 from Dr BN Suresh, President, INAE

Dr. V. Adimurthy, ISRO Honorary Distinguished Professor and Prof VS Borkar, Department of Electrical Engineering, Indian Institute of Technology Bombay were conferred the Prof Jai Krishna Memorial Award and Prof SN Mitra Memorial Award 2016 respectively.



Dr V Adimurthy receiving the Prof Jai Krishna Memorial Award 2016 from Dr BN Suresh, President, INAE



Prof VS Borkar receiving the Prof SN Mitra Memorial Award 2016 from Dr BN Suresh, President, INAE

Dr PS Goel, Honorary Distinguished Professor, ISRO Hqrs. and Raja Ramanna Chair Visiting Professor, National Institute of Advanced Studies, Bangalore and Formerly Secretary, Ministry of Earth Sciences and Dr VK Aatre, formerly Scientific Adviser to the Raksha Mantri, Director General of Defence Research & Development Organization and Secretary Department of Defence R&D were conferred the Life Time Contribution Award in Engineering 2016.



Dr PS Goel receiving the Life Time Contribution Award in Engineering 2016 from Dr BN Suresh, President, INAE



Dr VK Aatre receiving the Life Time Contribution Award in Engineering 2016 from Dr BN Suresh, President, INAE

Sidelines Meeting held on Dec 8, 2016

A sideline meeting chaired by Dr. PS Goel, Past President, INAE was held on Dec 8, 2016 at SAC, Ahmedabad. The Agenda for the meeting was to discuss the methodology to engage INAE Fellowship in the activities being undertaken with various Ministries/Niti Aayog/PSA Office/TIFAC etc. towards providing technical inputs for engineering interventions in policy formulation.

Meetings of INAE Forums on Dec 8, 2016

Meetings of the INAE Forum on Engineering interventions for Disaster Mitigation Chaired by Dr RK Bhandari and INAE Forum on Indian Landscape of Advanced Structural Materials Chaired by Dr Debashish Bhattacharjee were held on the sidelines of the Annual Convention on Dec 8, 2016 at SAC Ahmedabad.

Annual General Meeting of Fellows on Dec 9, 2016

The 28th Annual General Meeting of Fellows was held on Dec 9, 2016. During the Induction Ceremony, the following were formally admitted into the Academy by the President, INAE and signed the Admission Register.

Mr. Senapathy “Kris” Gopalakrishnan, Mr. TV Narendran, Dr. Uday Shankar Agarwal, Prof. Cato Thomas Laurencin, Prof. Baidurya Bhattacharya, Mr. Mangu Singh, Mr. Vinay V. Kulkarni, Prof. PJ Narayanan, Dr. Saptarshi Basu, Dr. C Ranganayakulu, Prof. B Ravi, Mr. NM Dube, Prof. JB Joshi, Prof. Yogesh M. Joshi, Prof. BG Fernandes, Prof. Neelesh B Mehta, Dr. Swades De, Prof. KVS Hari, Dr. R Muralidharan, Dr. PP Mohanlal, Mr. BHVS Narayana Murthy, Mr. S Somanath, Prof. DC Panigrahi, Prof. Rahul Mitra, Prof. Chandra Venkataraman, Mr. Vivek Bhasin, Prof. NS Raghuwanshi and Prof. Sampath Srinivasan.



Prof. Cato Thomas Laurencin being formally inducted as Foreign Fellow



Mr. Senapathy "Kris" Gopalakrishnan being formally inducted as Fellow of INAE



Mr. TV Narendran being formally inducted as Fellow of INAE



Prof. Chandra Venkataraman being formally inducted as Fellow of INAE

During the AGM, a Brainstorming Session was held wherein Dr BN Suresh, President, INAE requested the Fellows to give their suggestions. A number of valuable suggestions were received on the methodology for engagement of INAE Fellows for providing inputs to DST, other Government Agencies and Policymakers.

Thereafter, presentations by Conveners of Sectional Committees I, V and IX to present the activities planned during the year 2017 were held.

Session on Plenary Talks on Dec 9, 2016

Two Plenary Talks – one on a technical topic and one on a general topic. Mr. Rakesh Chopra, formerly head of the Kashmir Railway Project, on Zonal Railway and formerly Member Engineering, Railway Board delivered the Plenary Talk on “Challenges in J&K Rail Link” on Dec 9, 2016. The talk by Mr Rakesh Chopra was informative and gave a brief overview of the Indian Railways J&K project and the challenges faced in completing the project. Mr. Gaur Gopal Prabhu of ISKON delivered a general talk on “Ways to Happiness”. The talk by Mr Gaur Gopal explained the philosophy of how to be happy in a lighthearted manner.

Industry Session held on Dec 9, 2016

During the Industry Session on Dec 9, 2016 lectures were delivered by two Start Up Entrepreneurs viz Prof. Kavi Arya, Associate Professor, Computer Science and Engineering Department, IIT Bombay and Shri Parag Naik, CEO Saankhya. Prof Kavi Arya is Principal Investigator of the e-Yantra Project that is popularizing “project based learning” using robotics in engineering colleges. Prof Kavi Arya delivered a presentation on “Robot Enhanced Teaching in Engineering Colleges” which covered the huge demand for products, services and automation in India the light of the exponentially growing economy. Shri Parag Naik co-founded Saankhya and contributed to the product roadmaps and designing Saankhya architecture and spoke about his experiences in founding the company and gave a brief overview of the products developed by the start-up company.



Digital Knowledge Resource Centre

E-resources have become essential for research and academic activities and for faster retrieval of information in various disciplines. INAE had set up a Digital Knowledge Resource Centre (DKRC) at 6th floor, Vishwakarma Bhawan, Shaheed Jeet Singh Marg, New Delhi to have easy access to e-resources for research.

DKRC e- remote access

A Dell Power Edge Server has been installed at INAE Office. In order to get remote access to this INAE-DKRC server, a unique userid and password to each INAE Fellow has been assigned and intimated. Online remote access to e-resources has been enabled through a user friendly web interface powered by Knimbus Online Pvt. Ltd.

Online access to e-journals from various foreign publishers is available to INAE through NISCAIR-NKRC, DST-NISCAIR e-consortium. Presently the online databases from following publishers are accessible:

Name of Publisher	Number of Journals
IEEE Xplore	663
Emerald Insight	150
Royal Society of Chemistry	34
Taylor and Francis	430
Web of Science	Access from 1986 till date
Wiley	253

The above listed online databases can be accessed through INAE Server which is on for 24hrs, 7 days a week. Articles from the databases can also be downloaded at INAE DKRC on request sent by Fellows.

DKRC Online Repository

An institutional repository of Research work / Engineering contributions including abstracts of publications of individual INAE Fellows is being created in DKRC. This internal Repository would be used only for sharing of content within INAE Fellows.

Initially, it was decided that details of the research work in respect of INAE Fellows of Academia category and Research category may be prepared at DKRC as the research work pertaining to various Faculty members of IITs/ NITs/ Other Universities can be extracted from respective institutional websites. Research work of Fellows in Research category can be retrieved from public domain. During the last one year and a half we have prepared research details of 379 Fellows which have been sent individually to the concerned Fellows so that they may add/subtract/modify the text as deemed fit and send back to us. Presently 64 profiles have been uploaded. Since the profiles have been made based on details available in public domain, it has been decided that rest of the profiles will also be uploaded in the repository gradually with a disclaimer. We are still on the process of uploading the profiles.

The following features have been incorporated in the repository:

- a) **Search based on Author's name:** Any INAE Fellow may be able to search the research publications of another INAE Fellow by using author's name.
- b) **Search based on Engineering Discipline:** Any Fellow would also be able to search for research publication based on engineering discipline (e.g. electrical engineering, chemical engineering etc.).
- c) **Single Window Search:** Single window facility for searching based on topic, keyword, title of paper, subject or author name so that any INAE Fellow can get the desired research publication by using any of the criteria mentioned above.
- d) In the repository section, two separate blocks have been provided to access the research work – one block pertaining to research publications of INAE Fellows and the other block pertaining to CAETS Academies.

DKRC Expert Pool

To promote and advance the practice of engineering and technology and the related scientific disciplines in the country, INAE has launched a web based directory or EXPERT POOL in ENGINEERING of over 790 INAE Fellows and 104 young associates which has been hosted in INAE website.

This online database represents India's most accomplished and distinguished pool of engineers, engineer-scientists and technologists covering the entire spectrum of engineering disciplines. The pool of expertise available in INAE might be suitably harnessed and utilized for meeting the national ambition and mandate.

The online database or EXPERT POOL has been made based on engineering section with the objective to ensure easy access and connect the experts (FNAEs) registered in this web portal with individuals or agencies seeking their services.

DKRC had assisted in getting the profiles made for 218 Fellows and get them approved so that the same can be uploaded in the EXPERT POOL.

Till date 415 profiles have been uploaded.

Online National Essay Competition

In order to engage with the youth, INAE has constituted a Youth Forum which would conduct an 'Annual Youth Conclave' each year. As one of the activities by the forum, an Online National Essay Competition for the 4th year engineering students from B.Tech/ BE /BSc (Tech)/ Integrated MTech/ ME from all MHRD/AICTE approved institutions and universities was launched in this year.

The topic chosen for the year 2017 was **"Towards Technological Self-Reliance and Leadership"** and the essays were to be submitted online from Feb 15-Mar 15, 2017 in any of the four sections given below:

- **Section I:** Mechanical Engineering, Manufacturing, Civil Engineering and Management
- **Section II:** Electrical Engineering, Electronics & Telecommunications and Energy
- **Section III:** Bioengineering, Materials Engineering, Chemical Engineering and Mining
- **Section IV:** Computer Science & Engineering and Information Technology



To facilitate the online essay submission a software module was designed and uploaded which was integrated with INAE website and a link for submission was provided to the participants.

Overwhelming responses from engineering students were received. 2546 students registered out of which 972 essays were submitted by Mar 15, 2017.

The software module has option for allocation of essay to evaluators section wise and to record marks assigned to the submitted essays on blind review basis. 104 INAE Fellows had kindly consented to assist us in the evaluation process. The submitted essays have been allocated to all 104 reviewers. The process of evaluation is on. After the first round of evaluation, it has been decided that the top fifty essays would be screened by a committee and further evaluated for finalizing the awardees.

INAE Website Remodeling

A new website for INAE is also being developed to incorporate interactive facilities. As an initial phase, it has been decided to automate some fundamental activities undertaken by INAE e.g. nominations for fellowship, applications for AICTE- INAE schemes and others. This new website has plan of incorporating features of online platform for interaction between INAE Fellows and selected students from Engineering Colleges. Besides there will be sections with featured highlights on achievements of Fellows which will be published monthly.

Conversion of INAE publications in e book

INAE has several publications which had been uploaded on website as PDF documents. INAE Fellows had problems in downloading the documents and hence had requested for a format which is easily accessible. To facilitate reading online, FlipBook Creator Windows version (4.3.24) of Flippagemaker was purchased to convert INAE publications into flip book (e-book) format. The e-books are now available at INAE website through the link <http://inae.in/publications-2/> in easy readable format .

Publications of the Academy

Research Journal -INAE Letters

INAE has launched a quarterly journal “INAE Letters” published by M/s Springer. The objective of the journal is to provide a medium for rapid publication of new research results and invited short review articles across different domains of engineering science and technology. The first issue of the Research Journal “INAE Letters” was released by the Shri M Venkaiah Naidu, Hon’ble Minister for Urban Development, Housing & Urban Poverty Alleviation and Information & Broadcasting on Sep 1, 2016 at IIT Madras, Chennai during the sidelines of the Engineers Conclave 2016.

Dr Purnendu Ghosh, Chief Editor of Publications, INAE and Executive Director, Birla Institute for Scientific Research, Jaipur is the Editor-in-Chief and Prof SC Dutta Roy, FNAE is the Editorial Advisor of INAE Letters. The Members of the Editorial Board are Prof Santanu Bandyopadhyay, FNAE; Prof Bikamjit Basu, FNAE; Prof Subrata Chakraborty, FNAE; Prof Suman Chakraborty, FNAE; Prof Sivaji Chakraborty, FNAE; Prof A Chockalingam, FNAE; Prof Deepankar Choudhury; Prof Debabrata Das, FNAE; Prof Pradip Dutta, FNAE; Prof S Gopalakrishnan, FNAE; Prof Debatosh Guha, FNAE; Prof V Kumaran, FNAE; Prof Indranil Manna, FNAE; Prof Sukumar Mishra, FNAE; Prof Sanjay Mittal, FNAE; Prof AB Pandit, FNAE; Prof C Siva Ram Murty, FNAE; Prof Shanthi Pavan, FNAE; Dr Kota Bhanu Sankara Rao, FNAE; Prof Prasun Kumar Roy, FNAE and Prof Manoj Kumar Tiwari, FNAE who represent all the engineering disciplines covered under the 10 Engineering Sections of INAE.

The website for the Research Journal “INAE Letters” to include facility for submission of papers online has also been launched. The soft copy of the INAE Letters can be viewed at the link <http://www.springer.com/engineering/journal/41403>. Three issues of the Journal INAE Letters have been published so far.



(L. to R. Dr BN Suresh, President, INAE, Shri Vinay Sheel Oberoi, Secretary, HRD; Hon'ble Minister, Shri M Venkaiah Naidu and Prof Bhaskar Ramamurthi, Director, IIT Madras during the release of INAE Letters)

e-Annals of INAE

The soft copy of the Annals of the INAE Volume XIII, April 2016 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; can be downloaded from the link : <http://inae.in/ebook/annals-2016/mobile/index.html#p=1>

Second Report of INAE Forum on Technology Foresight and Management for Addressing National Challenges

INAE Forum on Technology, Foresight and Management under the Chairmanship of Mr VK Agarwal, FNAE; has brought out the second Report on addressing national challenges pertaining to Agriculture, Energy and Mass Transit Systems. India has advanced greatly in the last decade, however there are multi-fold challenges being faced by the common man including food, water & energy security, affordable healthcare, education for all citizens and access to economical transportation. These challenges are going to get magnified in the near future on account of demands placed by the ever-growing population. Therefore, there is a need to forecast and predict the technological interventions that shall play a vital role in mitigating these and other areas of concern for the society. A copy of the Report can be viewed under Publications at the INAE website (www.inae.in)

Post Proceedings of the CAETS 2015 Convocation on “Pathways to Sustainability: Energy, Mobility and Healthcare Engineering”

CAETS 2015 Convocation on “Pathways to Sustainability: Energy, Mobility and Healthcare Engineering” and Annual meeting was hosted by INAE on Oct 12-15, 2015 at New Delhi. The theme of the Convocation

was “Pathways to Sustainability: Energy, Mobility and Healthcare Engineering”. The CAETS Convocation reviewed the recent advances in developing sustainable intelligent systems, high efficiency distributions networks, energy devices, information and communication and allied tools in these sectors. The Convocation provided a platform for eminent experts from 26 CAETS Member Academies and participants from academia, industry and R&D organizations, to include young engineers from the world over, to meet and deliberate upon the pertinent issues on topics related to the theme of the conference and exchange their country specific experiences and knowledge. Subsequent to the meeting, all speakers in the Convocation were requested to submit the technical papers. The technical papers received have been compiled into an e-publication by M/s Springer (India) Private Ltd. The CAETS 2015 Convocation on “Pathways to Sustainability: Energy, Mobility and Healthcare Engineering” Proceedings published by M/s Springer was released during the INAE Annual Convention held on Dec 8-9, 2016 at Space Applications Centre (SAC), Ahmedabad.



Statement of Accounts

2016-17



Indian National Academy of Engineering



JAIN PRAMOD JAIN & CO.
CHARTERED ACCOUNTANTS

Phone : 41401901, 26943877
Fax : 26943877
Email : jainpjco@gmail.com
F-591, SARITA VIHAR
NEW DELHI - 110076

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, 2017 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, 2017; and
 - b) In the case of Income and Expenditure Account, of the surplus of Income over Expenditure of the Academy for the year ended on March 31, 2017.

PLACE: NEW DELHI
DATED: June 22, 2017

For JAIN PRAMOD JAIN & CO
CHARTERED ACCOUNTANTS
(FIRM REGISTRATION No. 016746N)

-Sd-
(CHIRAG BANSAL)
PARTNER
(Membership No. 539618)

BALANCE SHEET AS AT 31ST MARCH, 2017

(Amt in Rs)

	As at 31.3.2017	As at 31.3.2016
CORPUS/CAPITAL FUND AND LIABILITIES		
CORPUS/GENERAL FUND	10,92,93,882	10,22,66,300
earmarked funds	1,81,20,566	1,60,76,076
CURRENT LIABILITIES AND PROVISIONS	3,16,38,108	1,75,41,099
TOTAL	15,90,52,556	13,58,83,475
ASSETS		
FIXED ASSETS	3,49,55,398	3,90,10,268
INVESTMENTS	11,39,30,972	8,30,88,443
CURRENT ASSETS, LOANS & ADVANCES	1,01,66,186	1,37,84,764
TOTAL	15,90,52,556	13,58,83,475

As per our report of even date

On behalf of the Council:

FOR JAIN PRAMOD JAIN & CO
CHARTERED ACCOUNTANTS

Sd/-
(Dr BN Suresh)
President

Sd/-
(CHIRAG BANSAL)
Partner
(Membership No. 539618)
(Reg. No. : 016746N)

Sd/-
(Dr Purnendu Ghosh)
Vice-President
(Finance & Establishment)

Sd/-
(Brigadier Rajan Minocha)
Executive Director

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

Place : New Delhi
Dated : June 22, 2017



INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2017

(Amt in Rs)

	Current Year 2016-17	Previous Year 2015-16
INCOME		
Grants and Sponsorships	4,89,30,837	7,45,55,352
Delegate Registration Fees etc.	1,58,312	20,01,310
Transfer from General Fund	7,88,490	0
TOTAL	4,98,77,639	7,65,56,662
EXPENDITURE		
(1) Engineering Activities		
i) Seminars / Conferences / Symposiums / Workshops	52,15,360	52,56,387
ii) INAE Chair, Distinguished Professors & Mentoring Schemes	59,76,677	82,56,334
iii) Research Studies/ Projects	34,34,745	62,80,382
iv) INAE Awards	36,51,055	34,86,495
v) Academia-Industry Interaction	2,89,949	6,81,944
vi) INAE Forums	1,84,643	4,25,236
vii) Academy Meetings	25,91,186	21,50,727
viii) Annual Convention	21,52,535	27,50,800
ix) International Affairs	20,44,505	24,95,477
x) INAE Publications	15,52,494	37,97,287
xi) Financial Assistance for Engineering Activities	9,00,000	7,53,447
xii) CAETS 2015 Global Event	0	1,15,63,740
xiii) INAE Digital Knowledge & Research Centre Repository	2,63,656	10,51,080
(2) Establishment expenses	1,73,96,640	1,66,57,175
(3) Depreciation	42,22,193	49,70,744
(4) Loss on disposal of Assets	2,001	0
(5) Transfer to General Fund & Corpus Fund	0	59,79,407
TOTAL	4,98,77,639	7,65,56,662

As per our report of even date

For JAIN PRAMOD JAIN & CO
CHARTERED ACCOUNTANTS

Sd/-
(CHIRAG BANSAL)
Partner
(Membership No. 539618)
(Reg. No. : 016746N)
Place : New Delhi
Dated : June 22, 2017

On behalf of the Council:

Sd/-
(Dr BN Suresh)
President

Sd/-
(Dr Purnendu Ghosh)
Vice-President
(Finance & Establishment)

Sd/-
(Brigadier Rajan Minocha)
Executive Director

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

INAE OFFICE and DKRC

INAE Office, Gurgaon

Indian National Academy of Engineering
Unit No. 604-609, 6th Floor, Tower A,
SPAZE I-Tech Park, Sector 49, Sohna Road,
Gurgaon – 122018 (India)
Phone : (91) - 0124 - 4239480
Fax : (91) - 0124 - 4239481
E-mail : inaehq@inae.in

INAE Digital Knowledge Resource Centre (DKRC), New Delhi

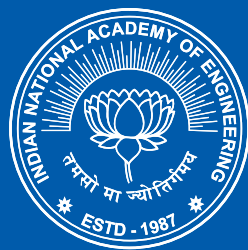
Indian National Academy of Engineering
6th Floor, Vishwakarma Bhawan
Shaheed Jeet Singh Marg
New Delhi - 110 016 (India)
Phone : (91) - 11 - 26582635
Fax : (91) - 11 - 26856635
E-mail : inaehq@inae.in

Registered under the Societies Registration Act 1860
(XXI of 1860) No : S-17673 of 20 April 1987

All Rights reserved 2017

Published by
Indian National Academy of Engineering

Designed and Printed at
Pratibha Printers Pvt. Ltd.
F-117, Sudershan Park, New Delhi-110015
Mobile : +91-9811100619
E-mail : ashishkhosla04@yahoo.co.in



Indian National Academy of Engineering