

Indian National Academy of Engineering



Annual Report - 2009

President's Foreword

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.

It 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.

1. To promote and advance the practice of engineering and technology and the related sciences and disciplines and their application to problems of national importance.
2. To disseminate information on all matters pertaining to 'Engineering' by publishing proceedings, journals, memoirs and by holding meeting, lectures, seminars, symposia etc.
3. To interact with professional bodies, engineering and scientific academies etc. already established or as may be established in future in India and abroad.
4. To represent at all academic forums, research and development activities on 'Engineering' in India and abroad.
5. To promote the National Policy on Education of the Government of India.
6. To offer the Government of India, the Local Governments and others, facilities for conferring with and ascertaining the views of 'Engineers' pertaining to 'Engineering' and to confer with the said Governments and others in cooperation with fraternal professional bodies
7. To encourage inventions, investigations and research and promote their applications for development of both organised and unorganised sectors of the national economy.
8. To institute and establish Professorship, Fellowship, Studentship, Scholarship, Awards and other benefactions and to grant Certificates of Competency and Charter whether under any Act of Government of India or otherwise howsoever.

Conferment of Republic Day Award

The following INAE Fellows have been conferred with the prestigious award of Padma Vibhushan and Padma Shri by the Hon'ble President of India on Republic Day, January 26, 2009.

Padma Vibhushan

- Dr. Anil Kakodkar
- Shri G Madhavan Nair

Padma Bhushan

- Dr. Sam Pitroda
- Prof. Thomas Kailath
- Dr. Bhakta B Rath

Seminars/Conferences

Seminar on Agenda for Reforms in Engineering Education

There have been significant changes in the practice of Engineering as a profession in the new millennium, such as the constraints imposed by environmental considerations; customization demanded by diverse customers; opportunities offered by technology developments in several sectors; availability of sophisticated diagnostic and computational tools and wide choice of materials. There have also been substantial changes in the different elements of the Engineering Education System – both world-wide and in our country, such as the quality and quantity of the several inputs to the system; the nature and scope of the outputs and outcomes from the system; the environment in which the Teaching – Learning – R&D processes take place; the impact of globalization and the implications of globalization, such as, for example, innovation as the basis of Competitiveness

A national Seminar on “Agenda for Engineering Education Reforms” was organized by INAE on February 23, 2009 at ISRO Satellite Centre (ISAC), Bangalore. Prof. R Natarajan was the Chair of this Seminar. Dr PS Goel, President INAE delivered the Inaugural Address. The objective of the Seminar was to take stock of the current status, identify major issues of concern and possible solutions. The seminar was attended by INAE Fellows and other eminent persons from academia, industry, and R&D labs. The topics of the presentations included Profile of Engineering Education in India- Status, Concerns and Recommendations; Engineering Education in India; Setting-up World-Class Universities in India; Model UG Engineering Curriculum recommended by AICTE; Developing a Culture of IP Creation and Industry Expectations and Obligations.

National Conference on “Alternative Communication and Assistive Technology for Persons with Disabilities

Recent technological advents in the areas of instrumentation, information and communication technology, embedded systems, material science, mechanical and electronics engineering have enabled development of affordable systems that can empower the physically and mentally challenged people to gain easier communication, access to education, employment and to be in the mainstream of day to day life. There are several organizations and schools who are dedicated to the cause of this segment of population however; development of indigenous affordable system and making them available to the end users still remains an unachieved goal. While quite a few noteworthy R&D efforts have been undertaken by different institutions, the last mile problem still persists.

INAE and the International Society for Augmentative and Alternative Communication (ISAAC) organized a two day conference to address the issue. The National Conference on Alternative Communication and Assistive Technology for Persons with Disabilities was held on March 14-15, 2009 at National Institute of Industrial Engineering, Mumbai. Prof Anupam Basu, Indian Institute of Technology, Kharagpur was the Chair of the conference. The format of the conference comprised of invited papers, keynote addresses, participatory panel discussions as well as demonstrations of recent systems from the industry and the academia. The discussion areas included technology support requirements from the user perspective; indigenous R&D efforts in India and sensitization of the industry and commercial houses including defining the market segment.

The conference was well attended, with about 80 attendees for the two days. There were two keynote addresses, one by Dr. Sudha Kaul, Executive Director of the Indian Institute of Cerebral Palsy, Kolkata and the second by Prof. Mohan Shivasahayam of IIT Madras. While the first one dwelt on the needs of AAC and the goals to be attained, the second keynote presented an interesting account of how Retinal Implants are being carried out and returning vision to the sightless – a dream come true. 32 research papers were presented by the technologists as well as by the different user groups, focusing on what has been achieved and what is required.

Technical Sessions were held on the following themes: Augmentative and Alternate Communication; Prosthetics; Voice Impairment; Mental and Learning Disabilities & Hearing Impairment and Visual Impairment. A Poster & Demonstration session was also held in which products and prototypes were displayed both from the industries and research laboratories including Smart Cane; Bus Identification System; Currency Identification System and Adjustable Design Prosthetics. The conference was attended by persons from Academia, R&D Institutions, concerned NGOs and the leading technology developers in the country in allied fields, besides Fellows of the Academy.

A very important component of the conference had been the demonstration of prototypes and products developed indigenously. Many of such systems have been developed with the active participation of the students of IIT Delhi, IIT Kharagpur and IIT Madras. Some of the user agencies as well as development labs, small entrepreneurs and national institutes, such as AYJNIHH also demonstrated some of their developments. The demonstrations generated a lot of interest.

The technical sessions were followed by a session on possible business models followed by a consolidation session. The consolidation session was open and interactive. The objective of the consolidation session was summarizing the experiences and requirements that came out through the regular sessions and to develop a set of recommendations towards actions, with the objective of making the country self-reliant in the area of rehabilitation engineering technology.

Recommendations emanating from the deliberations at the Conference have been sent to Ministry of Social Justice and Empowerment; Ministry of Communications & Information Technology; Ministry of Human Resource Development; Department of Science and Technology; Planning Commission; Council for Scientific and Industrial Research (CSIR); All India Council for Technical Education (AICTE); University Grants Commission; Department Of Industrial Policy & Promotion; and Bureau of Indian Standards.

Symposium on National Frontiers of Engineering (NatFOE)

The National Frontiers of Engineering Symposium was launched by the INAE in 2006 as its annual flagship event. It brought together about 40 outstanding engineers (ages ~30-45) from companies, universities, and government labs to discuss leading-edge research and technical work across a range of engineering fields. The Second National Frontiers of Engineering (NatFOE) was jointly organized by IIT Kanpur and IIT Delhi on March 31-April 1, 2007 at IIT Delhi. Having seen the success of this event, it was decided to make this as an annual event of the Academy. The Third National Frontiers of Engineering (NatFOE) organized by INAE, was held on October 24-25, 2008 at IIT Madras, Chennai. Prof. MS Ananth, Director, IIT Madras was the Chair of the Symposium. Thirty speakers from academia, industry and R&D institutions participated in the Symposium. The Symposium focused on four themes, namely, Manufacturing and Automobile; Materials; Aerospace; and Infrastructure. The deliberations on these topics were in the form of invited lectures, panel discussion and informal question and answer sessions with wider scope for interdisciplinary interaction.

The Fourth National Frontiers of Engineering (NatFOE4) was jointly organized by INAE and Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam during September 16-17,

2009 at Kalpakkam. The themes selected for the NatFOE4 symposium were, Energy, Materials & Manufacturing, Structural Integrity, and Communication & Networking.

After welcome by Dr. Kamachi Mudali, IGCAR, Dr. Jayakumar, Director, Metallurgy & Materials Group, IGCAR briefly covered the genesis of the NatFOE Symposia and the details of the technical programme. Thereafter, Dr. Baldev Raj, Distinguished Scientist, Director, IGCAR and Vice President, INAE, inaugurated the symposium. He highlighted the themes of the symposium and addressed about promoting young engineers and interaction between them and mentors to achieve excellence through interactions, discussions and collaborations. He appreciated the wide participation of eminent young and senior engineering professionals from academia, research and development and industry. The inaugural function was graced by Prof. Prem Krishna, Vice President, INAE and many other distinguished invitees from IGCAR, Kalpakkam. Brig SC Marwaha, Executive Secretary, INAE was also present. Among the total participation of 70 delegates, 40 young engineers were from all over India, in addition to a delegate from University of Tokyo, Japan. Shri Sumantra Mandal from IGCAR, one of the INAE Young Engineer awardees, proposed the vote of thanks.

For the technical sessions on energy, materials & manufacturing, structural integrity and communication & networking, the following senior engineers participated as Session Chairmen: Shri RK Sinha (BARC), Prof. Prem Krishna (INAE), Shri P. Ravindra Reddy (MTAR Technologies), Shri P. Swaminathan (IGCAR), Shri SC Chetal (IGCAR) and Dr. T. Jayakumar (IGCAR). The Lead Talks were delivered by Prof. B. Dattaguru (IISc), Dr. P. Chellapandi (IGCAR), Dr. Baldev Raj (IGCAR), Prof. B.S. Murty (IIT Madras), Dr. Surendra Pal (ISRO), Prof. U.B. Desai (IIT Hyderabad), Dr. T. Jayakumar (IGCAR) and Shri KK Vaze (BARC). Among the young engineers, 22 of them gave excellent presentations on the themes of the symposium spanning two days, followed by excellent interactions among the young engineers and peers on various aspects. These brainstorming interactions provided the way forward in each theme.

At the end of the technical sessions, Dr. A.K. Bhaduri, Head, MTD of IGCAR summarized the highlights of the discussions made during the presentations of each of the four themes selected for the symposium. In the concluding session of the symposium thereafter, Dr. Baldev Raj, Prof. Prem Krishna and Shri M.V. Kotwal (L&T) briefed about their impressions on the symposium and gave their views on carrying forward the technical issues and knowledge shared during the symposium. Dr. Baldev Raj highlighted the importance of such symposia and proposed that in coming years young engineers representing various international academies of engineering should be invited to NatFOE. This was well appreciated by all the participants and in particular Prof. Prem Krishna who felt that this would provide an opportunity for exchange of ideas and experiences on the technical and professional contributions of the young engineers from India and abroad. The symposium ended with a positive note on the technical excellence and lucid presentations of the eminent senior and young engineering professionals. The organizing committee of NatFOE thanked INAE for providing an opportunity to host the NatFOE 4 symposium at Kalpakkam.

Conference on “Research Policy for Sustainable Energy”

An International Conference on “Research Policy for Sustainable Energy” was organized by Indian National Academy of Engineering (INAE) during Oct 12-13, 2009 at New Delhi. Dr. R Chidambaram, Principal Scientific Advisor to the Govt. of India, while inaugurating the subject Conference emphasized that sustainable energy is crucial for survival of the planet due to emission and climate change concerns. Suitable energy technologies need to be developed specially geared to Indian conditions. Research Policy to be evolved during the Conference must facilitate development and deployment of such technologies and promote competency building. He listed several topics such as Solar Energy, Clean Coal Technologies, Smart and Micro Grid, Renewable Energy, Energy Efficiency, Hybrid Vehicles to be pursued in a National

Mission mode.

Dr. PS Goel, President, INAE mentioned that the recommendations evolved at the conference will be conveyed to the Government and policy makers for follow-up actions and specific action plans. Prof. SS Murthy, Co-Chair of the Conference highlighting the objectives of the conference mentioned that while conventional energy is not sustainable, alternate energy is not available. Hence there is a need to evolve a research policy to promote technology to be developed through a consortium of stake holders such as Industry, Academia, Govt. and user agencies. While funds are available with Govt. and global agencies, procedures to support research are very slow. Dr. RR Sonde, Co-Chair of the Conference welcoming the delegates suggested pilot demonstration projects through system integration

Mr. Anil Razdan, Former Secretary (Power), Chairman of WEC-IMC and Mr. Surya P Sethi, Principal Advisor (Energy), Planning Commission were among the key-note speakers. The plenary talks were delivered by Mr. Arunjai Mittal, Division President, IMM Group, Infineon Technologies AG, Neubiberg, Germany; Dr. Ajay Mathur, DG, BEE; and Mr. Shyam Saran, Special Envoy to Prime Minister on Climate Change.

Shri Surya P Sethi, Principal Advisor (Energy), Planning Commission presented some hard realities on Energy Scene in India with many practical constraints due to over population, political compulsions and cumbersome procedures. He wanted us to introspect why China is ahead by nearly 30 years on energy front. He listed Energy Efficient Chula to be of top priority.

Mr. Martin Thomas from Australian Academy of Technological Sciences and Engineering and Prof. Jatin Nathwani, Waterloo Institute for Sustainable Energy, University of Waterloo, Canada gave brief presentations on Energy R&D.

Other suggestions during the sessions were:

- (a) India needs to exploit all forms of energy and the discussions by a committee of specialists involving industry leaders; academics and policy makers are desirable.
- (b) An “Energy Technology Board” needs to be created to administer the projects chosen by the expert group.
- (c) India’s needs should be looked into comprehensively with special emphasis on rural and deprived sections of society.
- (d) There must be more pilot demonstration projects where the focus must be on “system integration” of the existing component level technologies.
- (e) ‘Directed Basic Research’ & Coherent Synergy aspects may be pursued for sustainable energy.

Workshop on “Making India Powerhouse for Semiconductor Design”

Silicon chip being pervasive in all sectors of development activities such as consumer, Information Technology and communications, industrial processes, healthcare, energy and agriculture, India needs to be a ‘Silicon Power’ to sustain and accelerate its economic growth. Due to synergetic approach, growing success of fabless operational model, employment and intellectual property (IP) generation potential, scope of entrepreneurship, relatively low capital requirement and acquired competence base, the time is ripe to strategize and build an India vision for being Semiconductor Design Powerhouse. Like nuclear energy and space programs, India must envision to get integrated with global silicon-powers adapting their growth model suitably tailored to its own conditions.

Indian National Academy of Engineering (INAE) organized a Workshop on “Making India Powerhouse for Semiconductor Design” on Oct 31-Nov 1, 2009 at India International Centre Annexe, New Delhi in collaboration with India Semiconductor Association (ISA) and supported by Ministry of Communication and Information Technology (MCIT) and Office of

the Principal Scientific Advisor to Government of India. Dr. Aloknath De, Prof. A.B.Bhattacharyya and Dr. M.J.Zarabi were the co-chairs of the Workshop.

Dr. PS Goel, delivering his Presidential Address, urged the participants to make specific actionable recommendations so that the same could be pursued with appropriate quarters for implementation. He also flagged attention of the participants to the emerging technologies involving other materials including polymers to perhaps replace silicon.

Important issues related to India's capabilities – strengths and weaknesses, opportunities – domestic and global and to find a way of intensifying the activity and give semiconductor design a collective push were discussed.

Prof. SK Brahmachari, DG, CSIR delivered an illuminating banquet lecture in which he exposed the audience to CSIR-led initiative on India Microprocessor on the lines of their earlier successful initiative relating to open source drug discovery.

The key recommendations emanating from the deliberations of the Workshop included promoting entrepreneurial spirits towards growing “Indian Companies”; easy access to fab for prototyping design ideas from university and R&D; establishing national-level semiconductor test and failure analysis facility; forming close-proximity clusters of universities and affiliated semiconductor industries; and executing specific programmes such as low-power design leading to next-generation products. Establishment of an appropriate coordinating organisation for these activities was also recommended.

Forthcoming Seminars/Workshops/Symposia 2010

- 1 Workshop on “Food Processing Technologies for Food Safety and Innovation”
(Feb 25-26)
- 2 National Workshop on “Impact of R&D on Indian Chemical Industry – Current Trends and Future Strategies”
(Mar/April)
- 2 Symposium on National Frontiers of Engineering (NatFOE)
- 4 Seminar on “Development of Technologies in DAE : Successes, Spin-off and New Opportunities” (Nov 25-26)
- 5 Workshop on “Synthetic Biology & Fabronics : Engineering in the 21st Century”

Academia-Industry Interaction

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

The Steering Committee during its meeting held on June 13, 2009 discussed the 29 nominations received for AICTE-INAE Distinguished Visiting Professorship Scheme for the year 2009 and selected 18 industry experts as per details given below. Out of these, 14 joint proposals from the Industry and Institutions have already been received.

S No	Name
1	Dr Sumitesh Das, Head, Materials Modeling and Product Design, TATA Steel, Jamshec
2	Dr Jagannath Nayak, Scientist F and Head, Fibre Optic System Division, Research Cent Imarat, DRDO, Hyderabad
3	Dr RK Ramanathan, Advisor & Consultant, Visual Collaboration Technologies Pvt. Ltd Bangalore and Formerly Outstanding Scientist, Aeronautical Development Agency (DI
4	Dr Kartick V Gourishankar, Senior Scientist, GE India Technology Centre Pvt Ltd, Ban
5	Dr S Sundarrajan, Scientist 'G', Dy. Programme Director, Defence Research and Development Laboratory (DRDL), Hyderabad
6	Dr Amarendra K Singh, Senior Scientist, Tata Consultancy Services Ltd, Pune
7	Mr Promit Biswas, Consultant-CTI, New Delhi
8	Dr M Nageswara Rao, Formerly CMD, Mishra Dhatu Nigam Ltd (MIDHANI) Hyderab
9	Mr KS Krithivasan, Addl. General Manager, Bharat Heavy Electricals Ltd, Ranipet
10	Mr MP Dixit, CMD, South Eastern Coalfields Ltd (SECL), Bilaspur
11	Mr K Jayaraman, Chief Mentor and Director, CICT Pvt Ltd, Bangalore
12	Dr G Ranganathan, CEO & Director, Rover Components Ltd, Coimbatore
13	Mr N Prabhakar, Scientist 'G', Project Director, AD(M), DRDL, DRDO, Hyderabad
14	Dr K Ramesh Kumar, Scientist 'F', DRDL, Hyderabad
15	Mr Nirbhar Neogi, ED, SAIL Safety Organization, Ranchi
16	Dr VK Jayaraman, Scientist 'G' (Retired), National Chemical Laboratory, Pune
17	Dr V Ramachandra, General Manager (Tech), Grasim Industries Ltd, Bangalore
18	Mr N Swaminathan, Principal Scientist, Tata Consultancy Services, Hyderabad

International Affairs

18th CAETS Convocation

The 18th CAETS (International Council of Academies of Engineering and Technological Sciences) event of the current year was held on July 13-17, 2009 at Calgary, Canada on July 13-17, 2009 and hosted by Canadian Academy of Engineering. INAE Delegation comprising Dr. PS Goel, President, INAE, Dr. P Chellapandi, IGCAR, Kalpakkam; Dr. VK Dadhwal, Dean, Indian Institute of Remote Sensing, Dehradun; and Brig SC Marwaha, Executive Secretary attended this event.

CAETS Convocation on "Natural Resources- Management and Sustainability" held during July 14-16, 2009 addressed the general challenges and opportunities associated with the sustainable management of natural resources. This included presentations by eminent experts on topics related to global natural resources, energy, forests and water management. Dr. Chellpandi and Dr. Dadhwal from INAE Delegation gave presentations on "An Approach to Energy Sustainability" and "Forests Monitoring for Sustainability" respectively. A statement from CAETS on "Global Natural Resources- Management and Sustainability" was issued following the Convocation. This Statement highlighted the issues related to energy, water management, forestry, and mining/minerals that must be considered in an integrated approach which examines their interdependencies and taps the cross-sector opportunities for novel strategies, processes and technologies to ensure sustainability.

The Council Meeting of CAETS was held on July 17, 2009. Besides the administrative actions and issues, a brief presentation was made by Dr Robin Batterham, President, ATSE on the proposed ATSE joint project on "Analysis of Strategies to Accelerate the Deployment of Low

Emissions Technologies for Electric Power Generation in Response to Climate Change”. Presentations were also made by Engineering Academy of Japan (EAJ) on “Eco-Innovation” and Swiss Academy of Engineering Sciences (SATW) on “Efficient Conversion and Reuse of Matter and/or Energy”.

The highlight of the INAE Delegation’s visit was the signing of MoUs between INAE and academies of the following countries on the sidelines of the CAETS event.

- 1) US National Academy of Engineering (NAE)
- 2) Royal Academy of Engineering UK, (RAEng)
- 3) Australian Academy of Technological Sciences and Engineering (ATSE)
- 4) Canadian Academy of Engineering
- 5) Chinese Academy of Engineering

The above MoUs will promote engineering and technological exchange and cooperation between INAE and the concerned academies for mutual benefit.

Discussion Meeting with Swiss Academy of Engineering Sciences (SATW), Switzerland

Prof. Arthur Ruf, Chairman of Committee on Foreign Relations; and Dr. Rolf Huegli, Secretary General from Swiss Academy of Engineering Sciences (SATW), Switzerland had a discussion meeting with Dr. PS Goel, President; Dr. MJ Zarbi, Vice-President and Brig SC Marwaha, Executive Secretary from Indian National Academy of Engineering (INAE) on October 19, 2009 at Ashoka Hotel, New Delhi.

Certain topics of mutual interest, viz., Engineering Education; Innovation; Energy Resources Management; and Sustainable Development were discussed during this meeting. A draft MOU between INAE and SATW was also handed over to Prof. Arthur Ruf.

Australia India Science & Technology Research Award

Australia India Science & Technology Research Award on “Energy Generation in a Low Carbon Future” instituted by Australian Academy of Technological Sciences and Engineering in association with Australian Government’s Australia India Council. The Award aims to promote strong research collaboration links between Australia and India; to recognise excellence in Technological Science and Engineering for early career Australian and Indian researchers and provide the opportunity of developing international links with their chosen field or research; and to enhance Australia-India joint research projects by information and skill sharing. Each year the Australia India Science and Technology Research Award topic reflects the national research priorities of Australia and India. This year the following scientists were selected for the Award.

Shri Ashish Garg, Department of Metallurgy & Materials Engineering, Indian Institute of Technology, Kanpur, India

Project Title: Investigations on Organic Solar Cell Devices to Achieve Long Life Times.

Shri Akshat Tanksale, ARC Centre of Excellence, University of Queensland, Australia

Project Title: Conversion of Glucose to Fuel Additive Methyl – Tetrahydrofuran (MTHF).

The following panel of experts selected the awardees.

Dr David Cook FTSE

Managing Director Davcem Consulting Services Pty. Ltd

Professor Ted Brown AC FREng FTSE

Senior Consultant, Golder Associates

Mr Martin Thomas AM FTSE

Co-Chair ATSE Energy Topic Forum; Chair Delhunty Power Ltd; Consultant, Tyree Holdings Pty. Ltd. ZBB Technologies Inc; Dir, EnviroMission Pty Ltd.

Mr Allan Gillespie FTSE

Honorary Fellow University of Sydney

Professor Dongke Zhang FTSE

Winthrop Professor of Chemical Engineering, University of WA

Mr John Sligar FTSE

Director, Sligar & Associates

Dr Baldev Raj FNAE

Director, Indira Gandhi Centre for Atomic Research and Vice-President, INAE

Prof Surendra Prasad FNAE

Director, Indian Institute of Technology, Hauz Khas, New Delhi

INAE was involved in the selection of applicants with Dr. Baldev Raj and Prof. Surendra Prasad in the Panel. The proposals were of high quality and there was a good competition among the applicants. The selection process was done through assessment of the applications received from prospective candidates and the final selection was done through teleconference hook-up.

Promoting Excellence in the Field of Engineering

Life Time Contribution Award in Engineering 2009

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. Dr. R Chidambaram, Principal Scientific Advisor to the Govt. of India and Mr. NR Narayana Murthy, Chairman & CEO, Infosys Technologies Ltd., Bangalore have been selected for Life Time Contribution Award in Engineering for the current year.

Prof. Jai Krishna and Prof. SN Mitra Memorial Award 2009

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 Award is given from among the disciplines of Engineering Section I (Civil Engineering), Engineering Section III (Mechanical Engineering), Engineering Section IV (Chemical Engineering and Biotechnology), Engineering Section VII (Aerospace Engineering) and Engineering Section VIII (Mining, Metallurgical and Materials Engineering) and Prof S N Mitra Memorial Award is given from among the disciplines of Engineering Section II

(Computer and Information Technologies), Engineering Section V (Electrical Engineering), Engineering Section VI (Electronics & Communication Engineering), Engineering Section IX (Nuclear Power and Energy Technologies) and Engineering Section X (Interdisciplinary Engineering and Technology).

Dr VK Saraswat, Scientific Advisor to Defence Minister, Ministry of Defence and Mr. Ashok Soota, Chairman & Managing Director, MindTree Ltd., Bangalore have been selected for Prof. Jai Krishna and Prof. SN Mitra Memorial Awards respectively.

INAE Young Engineer Award 2009

The Academy in 1996 instituted INAE Young Engineer Awards for 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, 124 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 this award for the year 2009 were sought from INAE Fellowship, Engineering institutions, R&D Labs during March 2008. Out of 97 candidates (including 20 carried over from the previous years), 31 were shortlisted by the Sectional Committees in their meetings held on August 21, 2009 at New Delhi. The shortlisted candidates gave presentation of their work before the Selection Committee on September 3, 2009.

The following candidates have been selected for INAE Young Engineer Award 2009 :-

1. Dr. Tarun Gupta, Assistant Professor, Department of Civil Engineering, Indian Institute of Technology Kanpur.
2. Dr. Parag R Gogate, Lecturer, Chemical Engineering Department, Institute of Chemical Technology (Deemed University), Mumbai
3. Dr. Amol A Kulkarni, Scientist, Chemical Engineering and Process Development Department, National Chemical Laboratory, Pune
4. Dr. Anandroop Bhattacharya, Staff Engineer(Mechanical & Thermal), Intel Technology India Pvt. Ltd., Bangalore
5. Dr. Jayant Kumar Singh, Assistant Professor, Department of Chemical Engineering, Indian Institute of Technology Kanpur
6. Dr. Asim Tewari, Staff Researcher, General Motors India Pvt. Ltd., Bangalore
7. Mr. Kamaljeet Singh, Sci/Engg 'SE', Semi-Conductor Laboratory, SAS Nagar, Chandigarh
8. Dr. Santanu Singha, Research Associate, Department of Electrical Engineering, Indian Institute of Science, Bangalore
9. Dr. Surender Baswana, Assistant Professor, Department of Computer Science, Indian Institute of Technology Kanpur
10. Dr. Sathish S Vadhiyar, Assistant Professor, Supercomputer Education and Research Centre, Indian Institute of Science, Bangalore
11. Mr. Santanu Sarma, Scientist/Engineer-SE, ISRO Satellite Centre, Control Systems Group, Bangalore.

Innovative Student Projects Award 2009

The Academy has instituted 'Innovative Student Projects Award' since 1998 to identify innovative and creative research projects undertaken by the students at three levels, B.E./B.Tech, ME/ M.Tech and Ph.D in Engineering Colleges.

Eighty nominations received, at Doctoral level (22), Master's level (17) and Bachelor level (41) were examined by the Selection Committee on August 20, 2009. Out of these, thirty nine nominations, at Doctoral level (13), Master's level (7) and Bachelor level (19) were shortlisted.

The shortlisted candidates gave presentations of their work before the Selection Committee on September 4, 2009 at New Delhi.

The following candidates have been selected for Innovative Students Project Award 2009.

Ph.D Level

1. Dr Karnail Singh, Research Engineer, GE, JFWTC, Bangalore
(Understanding Film Formation Mechanism in Latex Dispersions)
2. Dr. Ansuman Banerjee, Member of Consulting Staff, Interra Systems India Pvt Ltd, Kolkata
(Formal Methods for Accelerating Formal, Semi-Formal and Dynamic Property Verification Through Novel Specification Styles)
3. Dr. Chandrashekhhar N Bhende, Assistant Professor, Electronics and Communication Engg. Department, Indian Institute of Technology, Guwahati.
(Power Quality Analysis and Harmonic Control in Distribution Network)
4. Dr. Sanjay Gairola, Professor and Head, Department of Electronics and Communication, IMS Engineering College Ghaziabad.
(Multipulse AC-DC Converters for Power Quality Improvement)
5. Dr. K Ashoka Reddy, QIP Research Scholar, Department of Electrical Engineering, Indian Institute of Technology Madras.
(Novel Methods for Performance Enhancement of Pulse Oximeters)

M.E./M.Tech Level

1. Ms. A Anu Mary, Research Scholar, CLAD, Central Leather Research Institute, Chennai.
(Synthesis and Characterization of Hybrid Biodegradable Films from Collagenous Wastes and Cellulose Derivatives for Biomedical Application)
2. Mr. Rajesh Balagam, Lab 1, Department of Chemical Engineering, Indian Institute of Science, Bangalore
(Estimating the Effective Population size of HIV-1 in vivo)
3. Mr. Madhu S Nair, Lecturer, Department of Computer Science, Rajagiri College of Social Sciences, Kalamassery, Kochi
(Restoration and Enhancement of Color Images Using Fuzzy Approach)

B.E./B.Tech Level

1. Mr. Prajwal S, Mr. Sreekumar CR, Mr. Narayan Prasad N and Mr. Nikhil BN
Sri Bhagawan Mahavir Jain College of Engineering, Bangalore
(Microsatellite Subsystem Design and Analysis)
2. Mr. Lakshmanan S, Mr. Iniyam K, Mr. Keerthan Jagan Mohan and
Mr. Vinoth Kumar E B
Sri Ramakrishna Engineering College, Coimbatore
(Design and Fabrication of Indexing Table with Fixture Implementing SMED and Cost Reduction)
3. Mr. Nelvin Johny and Mr. Abel K Mathew
St. Joseph's College of Engineering, Chennai
(Fabrication and Comparison of Rotary Valve Engine with Cam Assembly Engine)
4. Mr. Nikhil Shah and Mr. Rachit Oza
Nirma University, Ahmedabad

- (*Recovery of Nickel from Spent Catalysts*)
5. Ms Joannah Ranjini Gabriel, Ms S Pratheeba and Ms Sharanya R Iyer
St. Joseph's College of Engineering, Chennai
(*A Non-Invasive Infant Monitoring System using CO₂ Sensors*)
 6. Mr. Fahad Ali Usmani and Mr. Shadab Mallick
Zakir Hussain College of Engineering and Technology, Aligarh Muslim University,
Aligarh
(*Performance Analysis of Analog Building Blocks in Technologies Beyond Silicon*)
 7. Mr. Dinesh Singh J and Mr. Natarajan R
Sri Sai Ram Engineering College, Chennai
(*'ASTHRA' - An Automated Robotic Vehicle for Disabled Patients Using Embedded Systems*)
 8. Mr. Prathamesh Dhole, Mr. Tanmoy Sinha and Mr. Sumeet Nayak
National Institute of Technology, Durgapur
(*Indigenously Built Low-Cost Online Dissolved Gas Analyser*)
 9. Ms V Aishwarya Vedham and Ms S Priyadharshini
St. Joseph's College of Engineering, Chennai
(*Design and Implementation of PLC based Load Management System*)
 10. Ms K Shashikala, Ms. M Sharmila, Ms K Sindhu and Ms R Sindhumathi
Sona College of Technology, Salem
(*Weed Detection using Multiresolution Analysis*)

Research Projects/Schemes

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

In connection with the above mentioned schemes, the following nominations for 2009 have been approved by the Council.

- *INAE Chair Professorship*
Prof. Indranil Manna, Chairman, Central Research Facility and Professor, Department of Metallurgical & Materials Engineering, Indian Institute of Technology, Kharagpur.
- *Mentoring of Engineering Teachers by INAE Fellows*

S No.	Engineering Teacher	Engineering Institution	Mentor
1	Mr. Pawan Kumar Patnaik	Bhilai Institute of Technology, Durg	Dr. Kamala Krithivasan
2.	Mr. Dwejendra Arya	Institute of Engineering & Technology, Alwar	Prof SK Koul
3	Ms. Arti Gupta	Geetanjali Institute of Technical of Studies, Dabok, Udaipur	Prof SK Koul
4	Dr. Ramakalyan Ayyagari	National Institute of Technology, Tiruchirapalli	Prof M Seetharama Bhat
5	Dr. Hemant Kumar Vinayak	National Institute of Technology, Hamirpur	Prof SK Thakkar

6	Mr. R Saravanan	College of Engineering, Guindy, Chennai	Prof. S Mohan
7	Mr. T Suma	VNR Vignana Jyothi Institute of Engineering & Technology, Hyderabad	Prof. MR Madhav
8.	Prof (Dr.) Rakesh Kumar Khare	Shri G. S. Institute of Technology of Science, Indore	Prof Sudhir K Jain
9.	Dr.Hemant B Kaushik	Indian Institute of Technology, Guwahati	Prof. Sudhir K Jain
10.	Dr. Sekhar Mandal	Bengal Engineering and Science University, Howrah	Prof Bidyut Baran Chaudhuri,
11.	Dr. Rajeev Gupta	Rajasthan Technical University, Kota	Prof B Bandyopadhyay
12.	Dr M Umopathy	National Institute of Technology, Tiruchirapalli	Prof B Bandyopadhyay
13	Dr. SR Samantaray	National Institute of Technology, Rourkela	Prof PK Dash
14	Mr. Deepak R	National Institute of Technology Calicut	Prof Anurag Kumar
15	Mr. Nilkanta Barman	Jadavpur University, Kolkata	Prof Pradip Dutta
16	Dr. K Siva Prasad	National Institute of Technology, Tiruchirapalli	Dr. BS Murty
17	Mr. Rajesh K Khatirkar	Visvesvaraya National Institute of Technology, Nagpur	Dr. BS Murty
18	Ms. J Jaya Priya	PSG College of Technology, Coimbatore	Dr. U Kamachi Mudali
19	Mr. Melvin P. Manuel	VIT University, Vellore	Dr. U Kamachi Mudali
20	Dr. N Murugan	Coimbatore Institute of Technology, Coimbatore	Dr. Baldev Raj
21	Mrs. Seyezhai Shivakumar	SSN College of Engineering and Technology, Kalavakkam, Chennai	Dr. Baldev Raj
22	Mr. P Raja	Manakula Vinayagar Engineering College, Madagadipattu, Pondicherry	Dr. Baldev Raj
23	Mr. J Palanivelu	Anjalai Ammal College of Engineering and Technology, Kovilvenni, Tiruvarur	Dr. T Jayakumar

24	Dr. Asit Kumar Khanra	National Institute of Technology, Warangal	Dr. K Bhanu Sankarara Rao
25	Dr. Chandra Prabha MN	MS Ramaiah Institute of Technology, Bangalore	Prof KA Natarajan

• *Mentoring of Engineering Students by INAE Fellows*

S No.	Engineering Student	Engineering Institution	Mentor
1	Mr. Bikram Konar	National Institute of Technology, Durgapur	Prof. KT Jacob
2	Mr. MS Vinod	RV College of Engineering, Bangalore	Lt Gen VJ Sundaram
3.	Mr. Prashant Malani	National Institute of Technology, Surathkal	Prof B Sundar Rajan
4.	Mr. N Giridharan	AVC College of Engineering, Mannampandal - Mayiladuthurai	Prof S Kalyanaraman
5	Mr. R Harihara Subramanian	National Institute of Technology, Tiruchirapalli	Dr. K Ramesh
6	Mr. Bharat Venkatesh	National Institute of Technology, Tiruchirapalli	Dr. K Ramesh
7	Mr. Mohammed Saad Bhamla	Indian Institute of Technology, Madras, Chennai	Dr. Ashish Lele
8	Ms. Amoghavarsha M	National Institute of Technology Karnataka, Surthkal	Prof. Vikram Jayaram
9	Ms. Pooja Lunia	Bengal Engineering & Science University, Shibpur, Howrah	Prof. Bhabatosh Chanda
10	Ms. Moumita Mazumdar	Bengal Engineering & Science University, Shibpur, Howrah	Prof. Bhabatosh Chanda
11	Mr. Mohamed Yaser	National Institute of Technology, Trichy, Tiruchirapalli	Prof. C Pandu Rangan
12	Mr. Deepak Kumar Singh	Institute of Technology, Banaras Hindu University, Varanasi	Prof. C Pandu Rangan

13	Ms. Veera Manek	Visvesvaraya National Institute of Technology, Nagpur	Prof. Sanjay Mittal
14	Mr S Swaminathan	National Institute of Technology, Tiruchirapalli	Prof SK Pal
15	Ms Debashree Das	University College of Science & Technology, Kolkata	Dr Tinku Acharya
16	Mr Rajdeep Mukherjee	University College of Science & Technology, Kolkata	Dr Tinku Acharya
17	Ms U Savitha	National Institute of Technology, Warangal	Dr GK Dey
18	Shri Vishesh Kalra	Vellore Institute of Technology, Vellore	Dr. Baldev Raj
19	Shri Ankit Gupta	GB Pant University of Agriculture & Technology, Pantnagar	Dr. T Jayakumar
20	Mr. Ishrat Badami	National Institute of Technology, Surat	Dr. Debashish Ghose
21	Ms. Esha Sharma	Asan Memorial Engineering College, Chengleput	Dr. U Kamachi Mudali
22	Mr. R Rajesh	Coimbatore Institute of Technology, Coimbatore	Dr. Baldev Raj
23	Mr. Mehta Darshit Nilesh	BITS, Pilani	Prof B Sundar Rajan
24	Ms. Shreya Mathur	Indira Gandlhi Institute of Technology, GGSIP University, Delhi	Prof. HB Mathur
25	Ms. P Harini	Visvesvaraya National Institute of Technology, Nagpur	Dr. K Bhanu Shankara Rao

Research Studies

The Academy undertakes studies on important/topical national issues each year. The objective of such study is to prepare a comprehensive/exhaustive document covering review of existing international and national technological and commercial aspects, analysis of options, future trends and specific implementable policy/recommendations and methodology of execution. The following studies have been approved by the Council.

Engineering Education

A Study Group comprising highly experienced and eminent experts in Engineering Education has been constituted by the Academy. After detailed deliberations, first draft of the comprehensive report has been prepared covering Historical Background; Characterization of Engineering Education with International Perspective; Challenges Faced by the Indian Engineering Education; Ethics of Engineering Practices; Faculty Related Issues; Curricula; Improving Teaching/Learning Processes; Governance and Management Issues; Promotion of Research and Industrial Interaction; Technology Assisted learning; Innovation, IPR and Entrepreneurship; National Initiatives; Implications of Legal Judgments and Consolidated Recommendations. The Study Report by the Task Force comprising Prof. KL Chopra, Prof. DV Singh, Prof. Gautam Biswas and late Prof. CS Jha has been finalized and printed as an INAE document in the form of a book. This report touches upon various facets of the subject and also contains a comprehensive set of recommendations. While there is a plethora of issues that needs to be addressed, there is a need to take up a few on priority which are given below:

1. First and foremost, there is a case to move from the top to minimize (ideally remove) malpractices in the appointments of Directors / Vice – Chancellors / BOG Chairmen. Such appointments must be made from amongst a data bank of persons of high level of competence and integrity, created for the MHRD by a search committee consisting of senior engineers and technologists from the academia, R & D as well as the industry. Appointments be made on the basis of the proceedings of selection committees, chaired likewise at the senior most level with members drawn from amongst the search committee.

This should be applicable to all institutions imparting Engineering education, whether under the control of Government (Central or State) or privately established.

In order to implement the culture of good governance, there is a need to create a duly empowered apex mechanism. In today's competitive environment, it is imperative to bring about flexibility and autonomy in governance, accompanied by due accountability. As also mooted in the Yash Pal committee report, the proposal herein is to create an Apex body or a commission which will not only serve to implement the above function but will also regulate governance, though not interfering on day to day basis. A proposed composition for a commission as related to Education in Engineering & Technology is given below. (*Requested Action: MHRD*)

- An Independent Body, served by MHRD
- MANDATE
 - * Appointment of – Vice Chancellors of Technical Universities (State and Central)
 - Heads of Technical Education Units like IITs, NITs, etc.
 - Principals of Private Engineering Colleges
 - Chairmen BOGs/MCs

- * Guidelines for
 - Engineering courses with regional needs, evolving Market needs, evolving technology
 - Course syllabii for each discipline.
 - Education pattern like recommendations of the 3 science academies in science education.
- * Independent review of running of institutions and giving feedback to State governments/MHRD
- * Advise HM, HRD on matters of Technical Education.

Constitution of Commission

Chairperson	Eminent educationist
Members:	(i) 3 members from amongst Directors of IITs/IISc/ Vice-Chancellors of Central Universities (Tech.)
	(ii) 3 members amongst Ex- Directors of IITs/IISc/ Ex Vice-Chancellors of Central Universities (Tech.)
	(iii) 1 representative of INAE
	(iv) 1 representative of INSA/IASC/NASI by rotation
	(v) 1 nominee by HM, MHRD
	Joint Secretary, Technical/Higher Education, MHRD - Member Secretary

2. The second most crucial problem is shortage of faculty. The current capacity is 8,00,000 plus graduates per annum. On the basis of prescribed minimum teacher – student ratio of 1:15, the number of faculty members required is 2,00,000. This is a daunting number, the quality apart. It is known that even the topmost engineering institutions of the country are short of faculty. Recruitment, development and retention of faculty therefore assumes great importance. There is clearly a potential for absorbing a large number of engineering teachers – perhaps 50,000 or more on a sustainable basis. The awareness of this fact could encourage graduates to pursue M.Tech/Doctoral degree programmes and consider teaching as a career.

Related issues are addressed below:

a. Attractive packages.

It is imperative that pay packages are to be attractive. Though pay – packages (+ perks) have improved steadily over the years, and can be said to be quite reasonable currently, the comparison with industry does not show parity. Such comparison is perhaps not necessary. Engineering graduates can be attracted more strongly towards teaching by introducing other forms of incentives, such as achievement based increments/promotions, more flexible and liberal norms for consultancy, as well as for research projects to enable augmentation in earnings. (*Requested Action: MHRD*)

b. Work Ethos & Environment

No sooner then one moves beyond the core of the limited number of good institutions of the country, the situation vis-à-vis ethos and environment is very poor. Faculty members have little or no say in the policy making and management of the institution for its growth and development. They are bound to feel that they have no stakes in the institution they serve. Furthermore, it is not uncommon to find staff members without proper cabins to sit in, apart from several other amenities expected, like a good library, internet facilities, etc. (*Requested Action: Concerned Institutions*)

c. Career Growth

In most institutions there is little opportunity to look beyond the basic task of day-to-day teaching programme with little encouragement or facilities for exposure to better institutions of teaching, interaction with industry, attendance at conferences, inculcation of a culture of research & development, and to improve qualifications. Thus those who join teaching have no interest in it and have nothing to look forward to.

The Quality Improvement Programme (QIP) has been one of the very successful initiatives of the MHRD in helping the development of faculties at the lesser institutions. A large scale expansion of this programme will be a great shot in the arm in allaying the problem in the preceding paragraph.

In addition a programme of mentoring can serve a very useful purpose for such teachers who have not had the opportunity of getting a higher degree and have been introduced into the system as a 'stop gap' measure.

A 'bank' of mentors can be created from amongst experienced teachers of Engineering & Technology and experts from the industry, for this purpose. It should be mandatory for the teachers with inadequate qualifications to be exposed to at least 3 cycles of short-term mentoring (one to two weeks) within the first year. One of these cycles ought to be with an industry expert. For this purpose, both mentors and mentees can be grouped into Mechanical Sciences/Electrical Sciences/Civil Engg. & Applied subjects/Natural Sciences. Furthermore, institutions within close proximity within a region can be grouped too.

The mentoring programmes should be given adequate weightage in the accreditation process.

The aspects such as opportunities for upgradation of technical competence and career growth and provision of appropriate amenities for teachers have to be given much greater emphasis in the accreditation process of engineering courses. The quantum of marks currently ear-marked in the accreditation process are too low for these very important aspects. Likewise teachers have to be given due opportunity to participate in management and policy making to enable them to develop an affinity towards their institutions. This aspect too should be duly recognized in the accreditation process. *(Action Requested: MHRD/AICTE/INAE)*

(d) 'Lean Diet' Approach

Despite the difficulties of getting adequate numbers in the faculty, it is preferable to keep to the minimum workable numbers and not to recruit persons below a certain level of competence for making a long term career in teaching. It is because of this policy that most IITs have not filled all their sanctioned positions.

It may be preferable to utilize the services, of senior retired but physically able academics of proven competence for teaching purposes (only), till such time that the crisis situation is tided over. In countries like the USA, many institutions don't retire academics at all, as long as they can offer useful teaching programmes.

(Action Requested: MHRD/Institutions)

3. Since it appears difficult, even with all the above mentioned propositions, to fulfill the faculty needs, the electronic medium be utilized to supplement with distant educational programmes. An ongoing example is the MHRD initiative, namely, 'Sakshat' – a National Mission on Higher Education through ICT – at a sizeable scale. *(Action Requested: MHRD/AICTE/INAE)*

4. Database for Engineering Graduates Needed in Coming Years.

It is not uncommon to find that often there is a shortage or a 'glut' of engineering graduates in a particular discipline/s at a particular given time. This position of course is 'fluid'. Whereas this is dictated to an extent by market forces, it is also symptomatic of a lack of planning in developing the engineering education programme. The latter cannot be remedied until there exists an authentic and dependable data base of the engineering graduates disciplinewise in, say, the coming two decades.

Whereas it cannot be said that this is not being attempted, there is a need to intensify that effort, and make it an ongoing dynamic process.

It is proposed that a joint INAE-MHRD group may set out the modalities for this task. Since the data bank will require to be updated at regular intervals, a dedicated cell will be the best for this purpose. (*Action Requested: INAE/MHRD*)

5. Approval for Starting Engineering institutions and for accreditation of their programmes. This should be an independent mechanism, within the overall umbrella of the commission proposed to be set up (App. II). (*Action Requested: MHRD/AICTE*)

6. Many Other Important Issues

Some of the propositions contained above will require detailing, and once accepted in principle, can be so pursued through a joint MHRD-INAЕ task force.

There are indeed a number of other important issues to be addressed for the reforms in higher technical education to be considered as comprehensive.

These are

- Modernization of curricula – to be undertaken regularly. The INAE can help through its Fellowship.
- Enhanced industry-academic institution interaction and entrepreneurship development
- Inculcation of ethical values
- IPR issues
- Increased access to engineering education /Setting up Student Loan Banks.

The INAE research report has dealt with these at length and detailing can be done on that basis, by the task force mentioned above.

Technologies for Healthcare Sector in India

A Study Group has been constituted to investigate both existing and emerging technologies for the healthcare sector in India. The report will address state of healthcare in India; role of engineering in healthcare sector; identification of priority areas/problems; technologies for healthcare sector; cost-effective technologies for the Indian market; equipment available in India including the limitations of the existing equipment; challenges that lie ahead and how the healthcare sector can be improved; and core recommendations. Dr. Rajeev Shorey is the Chairman of this Study.

Impact of Research on Chemical Industry – Current Status and Future Strategies

Dr. KV Raghavan is the Chairman of this Study. The aim of the Study is to enhance the relevance of basic and applied research to promote and strengthen industrial growth, innovation and competitive performance. This study will assess the impact of R&D on Indian Chemical Industry with specific reference to its profitability and global competitiveness; product diversification; fostering new entrepreneurs and start up ventures; quality and quantity of intellectual property generation; enhancing human resource capabilities and improving career paths of specialists; linkage with universities and R&D institutions; Government's R&D and innovation policies

including promotion of incubation concepts and strengthening specialty chemical exports and Indo-overseas joint ventures.

Impact of R&D on Indian Mining Industry Performance – Identifying the new priorities and strategic initiatives

Prof. AK Ghose is the Chairman of this Study. The aim of the Study is to assess the impact of R&D in the mineral sector; identify the performance shortfalls in terms of competitiveness, safety and environmental issues and address the challenges of the sector with aggressive R&D funding. For the purpose of this study, the Indian minerals sector will be segmented into coal and non-coal sectors and the past and current R&D initiatives will be assessed vis-à-vis their impact on industry performance and a new agenda of research priorities articulated. The exercise will also seek to identify how research could provide a competitive edge in the context of rapid pace of technological change through cleaner production and eco-efficiency. It will focus on mining industry's need for continued development, diffusion and interactive applications of ICT which will play a pivotal role in mining industry's performance, now and in the future.

INAE e-Newsletter

INAE monthly electronic Newsletter has been started with effect from September 2009 containing technology updates and aspects of frontiers of engineering as well as the news regarding INAE activities.

Annual Convention

The Annual Convention of the Indian National Academy of Engineering was held on December 17-18, 2009 at Convention Centre, SRI, Kalpakkam. The major scientific and engineering highlights of the Convention were the following technical presentations:

Presentations by newly elected Fellows

- | | | |
|-------------------------|---|---|
| Dr. T Balakrishna Bhat | - | Development of Indigenous Armour Technologies |
| Prof. K Gopakumar | - | Multilevel Inverter Topologies – Recent Trends in nearly Sinusoidal Voltage Generation for Motor Drive Applications |
| Prof. Ranjan Ganguli | - | Helicopter Rotor Health and Usage Monitoring |
| Dr. SK Chaudhuri | - | Indian Missile Systems & Technologies |
| Dr. MO Garg | - | Solvent Extraction Technology : Emergence of India as a Global Technology Provider |
| Mr. S Ramakrishnan | - | India's Access to Space : Self Reliance in Launch Vehicle Technology |
| Ms. Alpa Sheth | - | Effect of Perimeter Frames in Seismic Performance of Tall Concrete Building with Shear Wall Core and Flat Slab System |
| Prof. M Narasimha Murty | - | Efficient Schemes for Pattern Clustering |
| Dr. Suman Chakraborty | - | Super-Fluidity of Liquids in Narrow Confinements |
| Dr. J Krishnan | - | Challenges in Welding and Joining |
| Dr. Vikram Kumar | - | Contributions to the Development of Semiconductor Devices |
| Prof. Sunando Dasgupta | - | Oscillation in the contact line region of an evaporating thin liquid film |
| Dr. Sukumar Mishra | - | Bacteria foraging based Optimization Technique-Its Application to Power System |
| Dr. Kamachi Mudali | - | Corrosion Science and Technology Relevant to Fast Breeder Reactor Programme |
| Prof. PK Das | - | Understanding Multiphase Flow Endeavour through Experiments Modelling and Computational Simulation |

- Dr. RN Nayak - Technology Integration in Power Transmission
- Prof. Abhijit Mukherjee - In Search of Sustainable Binder in Building Materials
- Prof. DK Paul - Response to Reactor Buildings to Extreme Loadings :
Earthquake, Blast and Impact

Presentations by Young Engineer Awardees 2009

- Dr. Tarun Gupta - Development and Performance Evaluation of an In-Developed Air Sampler Designed to Collect Submicron Aerosol
- Dr. Sathish S Vadhiyar - Grid Middleware for High Performance Computing
- Mr. Santanu Sarma - A Centralized Data Acquisition, Telemetry, and On-board Storage for Satellite Application
- Dr. Amol A Kulkarni - Design and CFD Modelling of Vortex Diodes
- Dr. Jayant K Singh - Phase Transition of Fluid Near Surfaces
- Dr. Parag R Gogate - Process Intensification using Cavitation Reactors
- Dr. A Bhattacharya - Cooling Challenges for Future Generation on Laptop Computers
- Dr. Asim Tewari - Spatial Characteristics of Thin Microstructures
- Dr. Surender Baswana - Simple and Efficient Algorithms for various Path Problems
- Dr. Santanu Singha - Nano-Dielectric Drivers for Next Generation Insulation System

The 21st Annual General Meeting of Fellows was held in the afternoon on the same day. During the Induction Ceremony, 28 Fellows were formally admitted into the Academy. The Grand Award Ceremony was held at 5 PM on December 17, 2009.

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. Five candidates at Doctoral level, three at Master's level and ten at Bachelor level were given Innovative Student Projects Awards.

To recognize outstanding contributions made by young engineers to any branch of Engineering, the INAE Young Engineer Award was instituted in 1996 for engineering research, excellence in engineering design, technology development and technology transfer. Eleven candidates were awarded INAE Young Engineer Award. .

Prof. SN Mitra and Jai Krishna Memorial Awards are given to an eminent engineer, engineer-scientist or a technologist for academic and scholarly achievements in any discipline of technology. Prof Jai Krishna Award is given from among the disciplines of Civil Engineering, Mechanical Engineering, Chemical Engineering and Biotechnology, Aerospace Engineering and Mining, Metallurgical and Materials Engineering. Dr. VK Saraswat was conferred the Prof. Jai Krishna Memorial Award 2009. Prof S N Mitra Memorial Award is given from among the disciplines of Computer and Information Technologies, Electrical Engineering, Electronics & Communication Engineering, Engineering Nuclear Power and Energy Technologies and Interdisciplinary Engineering and Technology. Mr. Ashok Soota was conferred the Prof. SN Mitra Memorial Award 2009.

The Lifetime Contribution 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. Dr. R Chidambaram, Principal Scientific Adviser to the Govt. of India & DAE Homi Bhabha Chair Professor, New Delhi and Mr. NR Narayana Murthy, Chairman of the Board and Chief Mentor, Infosys Technologies Ltd., Bangalore were conferred Life Time Contribution Awards in Engineering 2009. Life Time Contribution Award lectures were delivered by Dr. R Chidambaram and Mr. NR Narayana Murthy. Prof Jai Krishna and

Prof. SN Mitra Memorial lectures were delivered earlier in the day by Dr. VK Saraswat and Mr. Ashok Soota respectively.

The Fellowship

The following were elected for INAE Fellowship (effective from January 1, 2010) by the Governing Council.

1. Dr. Durgesh C Rai, Associate Professor, Department of Civil Engineering, Indian Institute of Technology Kanpur
2. Prof. Santosh Kapuria, Department of Applied Mechanics, Indian Institute of Technology
3. Dr. VN Sharda, Director, Central Soil & Water Conservation Research & Training Institute
4. Mr. N Raghavan, Advisor, ECC Construction Division, Larsen & Toubro Ltd., Chennai
5. Prof. Rajeev Sangal, Director, IIIT, Gachi Bowli, Hyderabad
6. Prof. JR Haritsa, SERC, Indian Institute of Science, Bangalore
7. Prof. Vijay Chandru, Chairman & CEO, Strand Life Sciences, Bangalore
8. Prof. KN Seetharamu, MS Ramaiah School of Advanced Studies, Bangalore
9. Prof. Ashitava Ghosal, Department of Mechanical Engineering, Indian Institute of Science, Bangalore
10. Dr. Sekhar Majumdar, Scientist 'G' & Dy. Director, Head, Computational & Theoretical Fluid Dynamics, National Aerospace Laboratories, Bangalore
11. Dr. R Mahadevan, Group Technology Director, India Pistons Ltd., Chennai
12. Prof. SK Gupta, Department of Chemical Engg., IIT Bombay, Mumbai
13. Prof. Anurag Mehra, Head, Department of Chemical Engg., IIT Bombay, Mumbai
14. Dr. Chandan Chakraborty, Associate Professor, Electrical Engineering Department, IIT Kharagpur
15. Prof. Mrityunjay Chakraborty, Department of E&ECE, IIT Kharagpur,
16. Dr. Nagappa Ramamurthy, Scientist 'F', Signal Processing Group, Centre for Artificial Intelligence and Robotics, Bangalore
17. Dr. Shashi Bhushan Sharma, Deputy Director, Antenna Systems Area, Space Application Centre, Ahmedabad
18. Mr. Malla Reddy B, Managing Director, Astra Microwave Products Ltd., Hyderabad
19. Dr. Gopalan Jagadeesh, Associate Professor, Aerospace Engineering Department, Indian Institute of Science, Bangalore
20. Dr. AR Upadhyay, Director, National Aerospace Laboratories, Bangalore
21. Dr. U Ramamurthy, Associate Professor, Department of Materials Engineering, IISc., Bangalore
22. Prof. Subrata Ray, Professor and Dean, Sponsored Research and Industrial Consultancy, IIT Roorkee
23. Dr. S Srikanth, Scientist-F (Dy Director) and Head, National Metallurgical Laboratory Main Centre, Chennai
24. Dr. LK Singhal, Director, Jindal Stainless Ltd., Hisar
25. Mr. RG Agrawal, Head, Refuelling Technology Division, BARC, Mumbai
26. Mr. PK Wattal, Head, Back End Technology Development (Reprocessing & Waste Management), BARC, Mumbai
27. Prof. UC Mohanty, Centre for Atmospheric Sciences, Indian Institute of Technology Delhi, New Delhi
28. Mr. AS Kiran Kumar, Deputy Director, Sensors Development Area, Space Applications Centre, Ahmedabad
29. Prof. SK Brahmachari, DG, CSIR, New Delhi

Foreign Fellows

1. Dr. Ahsan Kareem, Robert M Moran Professor of Engineering, NatHaz Modeling Laboratory, University of Notre Dame, Notre Dame, USA
2. Dr. C Mohan IBM Fellow, IBM Almaden Research Centre, USA

Lectures and other events including those organized by Local Chapters

- (a) Dr. Pradip, Convener, SC-VIII and Honorary Secretary, Dr. Dara P Antia Memorial Lecture Committee organized Dr. Dara P Antia Memorial Lecture which was delivered by Prof. Subra Suresh, Dean of Engineering, Massachusetts Institute of Technology (MIT), USA on January 23, 2009.
- (b) INAE Kolkata Chapter celebrated 'National Science Day' on March 2, 2009. On this occasion, a Seminar lecture entitled "Modern Tools for Impulse Fault Diagnosis" was delivered by Prof. Shivaji Chakravorti, Electrical Engineering Department, Jadavpur University, Kolkata. A large number of students and researchers attended function.
- (c) Lectures organized by INAE Mumbai Local Chapter
 - (i) Lecture entitled "Micellar Nanoparticles for Medical Diagnostics and Therapeutics" delivered by Prof. Matthew Tirrel, Dept. of Chemical Engineering and Materials Biomolecular Science & Engineering, Materials Research Laboratory, Institute for Collaborative Biotechniques, California NanoSystems Institute, University of California, USA on March 6, 2009.
 - (ii) Lecture entitled "An Approach to Energy Sustainability in India" delivered by Dr. Baldev Raj, Distinguished Scientist and Director, Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam on November 6, 2009
- (d) Summer Camp 2009 organized by IIT Kanpur to promote Civil Engineering
Till a few decades back, Civil Engineering was considered mother of all engineering disciplines. Today, it is not even regarded as viable career option. The potential students of Civil Engineering appear to have been disheartened by the importance given to other engineering disciplines. A strong need was felt to recreate the interest of Civil Engineering to induct a new generation of highly competent and motivated youth. The idea of Summer Camp was initiated during the year 2001 and has been progressing each year. Every year, about forty students hailing from various Engineering Colleges spreading all over the country are invited for the Camp. The activities of the Camp include talks by leading professionals from the Industry highlighting the challenges in the profession, visit to some important civil engineering projects/structures and finally making presentations of the projects studied in their own places. These Summer Camps which are being conducted continuously since the year 2001 by IIT Kanpur, have rebuilt the dignity and pride back into the profession of Civil Engineering in India. The Academy has been giving partial financial support to these Camps since the year 2001 and has sanctioned an amount of Rs.1.5 lakhs for the conduct of Summer Camp 2009.

Annals of INAE

The Annals of the INAE (Volume VI) 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 2008 has been printed and distributed to the Fellowship of the Academy.

Honours and Awards

1. Dr. Baldev Raj, Distinguished Scientist and Director, Indira Gandhi Centre for Atomic

Research, Kalapakkam and Vice-President, INAE has been selected for conferment of Dr. Homi Jehangir Centenary Award. The Award was presented on April 10, 2009 at a special function to be organized jointly by Nayudamma Centre for Development Alternatives and RMK Engineering College, Tamil Nadu at RMK Engineering College, Kavaraipettai, Tamil Nadu.

2. Dr V Ramaswamy, Professor, Department of Metallurgical Engineering, PSG College of Technology, Coimbatore was awarded the Tata Gold Medal for the year 2008 by the Indian Institute of Metals in recognition of his significant contributions to the metallurgical industry.
3. Prof. Ashutosh Sharma, Institute Chair Professor, Department of Chemical Engineering, Indian Institute of Technology, Kanpur has been awarded the TWAS Prize in Engineering Sciences for the year 2008 by TWAS for his fundamental and significant contributions to meso-mechanics; instabilities and self-organization in soft thin films; meso-patterning; wetting; adhesion and interfacial interactions.
4. Dr Sanak Mishra, Past Vice-President (Academic, Professional & International Affairs), INAE and Chief Executive Officer, India Greenfield Projects, ArcelorMittal , New Delhi has been awarded the Distinguished Alumnus Award of the Indian Institute of Science, Bangalore on the occasion of its Centenary Year (2008).
5. Prof. RS Sirohi, Vice-Chancellor, Amity University Rajasthan, Jaipur has been conferred with SPIE Gabor Award 2009 by SPIE-The International Society for Optical Engineering in recognition of his outstanding accomplishments in diffractive wavefront technologies, especially those which further the development of holography and metrology applications. He has also been conferred with UGC National Hari Om Ashram Trust Award entitled Homi J Bhabha Award in recognition of his outstanding scholarly contribution.
6. Dr. Surendra Pal, Distinguished Scientist and Associate Director, ISRO Satellite Centre, Bangalore has been conferred with 2010 IEEE Judith A Resnik Award by IEEE Awards Board
7. Prof. MR Madhav, Professor Emeritus, JNTU College of Engineering, Hyderabad has been conferred with Bharat Ratna Sir Mokshagundam Visvesvaraya Award on Sep 15, 2009 by the Govt. of Andhra Pradesh and Institution of Engineers(India), A.P. State Centre for his outstanding contribution in the field of Engineering.
8. Dr. Prahlada, Distinguished Scientist and Chief Controller R&D, DRDO Hqrs. has been conferred with “Eminent Engineer Award” for the year 2009 by Institution of Engineers (India), Delhi State Centre for his distinguished services in engineering profession.
9. Prof. AB Bhattacharyya, Emeritus Professor, Jaypee Institute of Information Technology, Noida has been conferred with Indian Semiconductor Association’s Technovisionary Award for the year 2009
10. Mr. A Sanatkumar, Formerly Sr. Executive Director (OP&TT), NPCIL, Mumbai has been conferred with INS-Homi Bhabha Lifetime Achievement Award for the year 2007

News of Fellows

1. Late Prof Jai Krishna, Former Vice-Chancellor, University of Roorkee and Founder President, Indian National Academy of Engineering has been elected posthumously as a “Legend of Earthquake Engineering” at an event sponsored by ANCER (Asian-Pacific

Network of Centres for Earthquake Engineering Research) for his unique, exceptional and lasting contributions to Earthquake Engineering

2. Professor Bimalendu B. Bhattacharya, INAE Distinguished Professor, Satyendra Nath Bose National Centre for Basic Sciences (SNBNCBS), Salt Lake, Kolkata and Formerly Director, Indian School of Mines, Dhanbad has become Member of the Reconstituted Advisory Council of Directorate General of Hydrocarbons (DGH), Ministry of Petroleum & Natural Gas, Govt. of India and Member of the Reconstituted Subject Expert Committee on Earth & Atmospheric Sciences of the DST programme called "Fund for Improvement of S&T infrastructure in Universities & other Higher Educational Institutes (FIST).
3. Dr. K Kasturirangan, Formerly Chairman, Space Commission and Secretary, Department of Space, Bangalore; Formerly Director, National Institute of Advanced Studies, Bangalore has become Member, Planning Commission, New Delhi.
4. Dr. Baldev Raj, Distinguished Scientist and Director, Indira Gandhi Centre for Atomic Research, Kalapakkam has been selected as Vice-President of the International Institute of Welding, France.
5. Dr. Sanak Mishra, Chief Executive Officer, India Greenfield Projects, ArcelorMittal , New Delhi has been elected as President of the Indian Institute of Metals (IIM) for the year 2009-10.
6. Prof. J Nanda, INSA Honorary Scientist, Department of Electrical Engineering, Indian Institute of Technology, New Delhi has been appointed as a Member of National Board of Accreditation and Chairman, Engineering Accreditation Committee for overseeing the accreditation of all UG and PG programmes for all engineering colleges in the country inclusive of National Institutes of Technology.
7. Prof. Sivaji Chakravorti, Department of Electrical Engineering, Jadavpur University, Kolkata has informed that IEEE PE Chapter of Kolkata has been selected for recognition as having the best performance during the last 10 years by IEEE Power & Energy Society.
8. Dr. K Bhanu Sankara Rao, Associate Director, MDCG, IGCAR, Kalpakkam has assumed office of Dean, School of Engineering Sciences and Technology, University of Hyderabad w.e.f. August 1, 2009.
9. Prof. A.K.Ghose, Fellow, participated in the Centenary Celebrations of China University of Mining & Technology, Xuzhou between 16-19 October. He was invited to present a keynote paper on "Sustainable Mining : Technology Vision to 2050" at the International Conference on Mining Science and Technology.
10. Dr. Vijay Kelkar, Chairman, Finance Commission has been elected as Chairman of the Forum of Federations, an international headquartered in Ottawa which seeks to strengthen democratic governance by promoting dialogue on the practices, principles, and possibilities of federalism through partner governments.
11. Prof. AB Bhattacharyya, Emeritus Professor, Jaypee Institute of Information Technology, Noida has written a book on "Compact MOSFET Models for VLSI Design" which has been published by John Wiley & Sons and IEEE as international edition. (companion website : www.wiley.com/go/bhattacharyya). The book targets Professionals, Research community and postgraduate students; Price : \$122 and Indian Distributor : IK International.

Governing Council

President	:	Dr. PS Goel, Chairman, Recruitment & Assessment Centre, DRDO, Ministry of Defence
Immediate Past President	:	Dr. K Kasturirangan, Member, Planning Commission
Vice-President (<i>Academic, Professional & International Affairs</i>)	:	Dr. Baldev Raj, Director, IGCAR, Kalpakkam
Vice-President (<i>Fellowship, Awards & Corporate Communication</i>)	:	Prof. Prem Krishna, Formerly Professor & Head of Civil Engg., IIT Roorkee
Vice-President (<i>Finance & Establishment</i>)	:	Dr. MJ Zarabi, Formerly Chairman-cum-Managing Director, Semiconductor Complex Ltd., SAS Nagar
Chief Editor of Publications	:	Prof. AK Ghose, Formerly Director, Indian School of Mines, Dhanbad
Members	:	Prof. SK Kaushik, Formerly Professor and Head, Indian Institute of Technology, Roorkee
	:	Prof. B Yegnanarayana, Professor and Microsoft Chair, International Institute of Information Technology, Gachibowli, Hyderabad
	:	Capt NS Mohan Ram, Adviser, TVS Motor Company Ltd., Hosur.
	:	Prof. DV Khakhar, Director, IIT Mumbai
	:	Mr. RP Singh, CMD, Powergrid Corporation of India, Gurgaon
	:	Dr. Rajeev Shorey, Vice-Chancellor, NIIT University, District Alwar, Rajasthan
	:	Dr. TK Alex, Director, Lab. for Electro-Optic Systems (LEOS) , ISRO, Bangalore
	:	Prof. SP Mehrotra, Indian Institute of Technology, Kanpur
	:	Dr. RR Sonde, Executive Vice-President, Thermax Ltd., Pune
	:	Prof. Sneh Anand, Indian Institute of Technology, Delhi
Government Representatives		
Ministry of Science & Technology	:	Dr. G Sundararajan, Director, ARCI, Hyderabad
Department of Space	:	Mr. PS Veeraraghavan, Director, ISRO Inertial Systems Unit, Thiruvantapuram
Ministry of HRD	:	Prof. Ashok Jhunjhunwala, Indian Institute of Technology Madras, Chennai
Representative of All India Council for Technical Education	:	Prof. KL Chopra, Former Director, Indian Institute of Technology, Kharagpur
Representative of Cooperating Academies		
Indian National Science Academy	:	Dr. Srikumar Banerjee, Director, Bhabha Atomic Research Centre, Mumbai
Indian Academy of Sciences	:	Prof. N Balakrishnan, Associate Director, Indian Institute of Science, Bangalore

National Academy of Sciences (India)	:	Prof. Prem Vrat, Honorary Visiting Professor, Dept of Mech Engg, IIT Delhi
Indian Science Congress Association	:	Dr. P Rama Rao, ISRO Dr. Brahm Prakash Distinguished Professor, ARCI, Hyderabad
Asiatic Society	:	Prof. Ashoke Ranjan Thakur, VC, West Bengal University of Technology, Kolkata
Professional Bodies		
The Institution of Electronics and Telecommunication Engineers	:	Prof. BL Deekshatulu, Formerly Director, National Remote Sensing Agency, Hy'd
The Institution of Engineers (India)	:	Prof. CS Jha, Former Vice Chancellor, Banaras Hindu University, Varanasi
Representative of Confederation of Indian Industry (CII)	:	Mr. Anjan Das, Senior Director & Head – Technology, IPR & Technology Development Centres, CII, Gurgaon

Committees of Council

Sectional Committee-I *(Civil Engineering)*

Convener

Mr. SS Chakraborty

Members

Prof. Sudhir K Jain

Prof. NN Som

Dr. RK Bhandari

Dr. SR Singh

Prof. Prem Krishna

Prof. S Mohan

Mr. PC Koteswara Rao

Dr. PC Basu

Sectional Committee-II *(Computer and Information Technologies)*

Convener

Prof. PP Chakrabarti

Members

Mr. PS Dhekne

Dr. Jayanta Basak

Prof. S Chaudhuri

Prof. B Yegnanarayana

Dr. K Ramamritham

Dr. M Vidyasagar

Prof. Kamala Krithivasan

Dr. S Ramani

Sectional Committee-III *(Mechanical Engineering)*

Convener

Prof. Amitabha Ghosh

Members

Prof. Gautam Biswas

Dr. BK Dutta

Prof. Souvik Bhattacharyya

Prof. NK Gupta

Prof. T Sundararajan

Prof. R Narasimhan

Dr. K Aprameyan

Dr. RB Grover

Sectional Committee-IV *(Chemical Engineering and Biotechnology)*

Convener

Dr. KV Raghavan

Members

Dr. Purnendu Ghosh

Dr. Ashish K Lele

Prof. JM Modak

Prof. Ashutosh Sharma

Prof. JR Bellare

Dr. RV Jasra

Prof. KS Gandhi

Dr. Rajiv I Modi

Sectional Committee-V *(Electrical Engineering)*

Convener

Prof. PK Dash

Members

Dr. M Arunachalam

Dr. VR Kanetkar

Prof. J Nanda

Prof. VS Borkar

Dr. JJ Patel

Prof. KR Rajagopal

Mr. Manjit Singh

Prof. GR Nagabhushana

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

Convener

Dr. Surendra Pal

Members

Dr. V Nagarajan

Prof. RK Mallik

Dr. KN Sivarajan

Prof. B Sundar Rajan

Dr. G Venkatesh

Dr. Rajeev Shorey

Dr. Tinku Acharya

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

Dr. TK Alex

Members

Dr. VK Saraswat

Dr. KG Narayanan

Prof. B Dattaguru

Mr. Tapan Misra

Dr. Prahlada

Dr. V Adimurthy

Prof. NK Naik

Mr. M Subba Rao

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

Dr. Pradip

Members

Dr. HS Maiti

Dr. Dipankar Banerjee

Dr. AK Chatterjee

Prof. Indranil Manna

Dr. N Ramakrishnan

Dr. Debashish Bhattacharjee

Dr. BK Mishra

Dr. K Bhanu Sankara Rao

Sectional Committee-IX*(Nuclear Power and Energy Technologies)***Convener**

Mr. SA Bhardwaj

Members

Mr. TK Bera

Dr. RR Sonde

Mr. RD Kale

Mr. S Basu

Dr. LM Gantayet

Mr. SS Bajaj

Mr. M Rajan

Mr. VK Sharma

Sectional Committee-X*(Interdisciplinary Engineering and Technology)***Convener**

Dr. V Rao Aiyagari

Members

Dr. RP Mohanty

Mr. Paritosh C Tyagi

Prof. SK Guha

Dr. V Sumantran

Dr. Vijay Kelkar

Dr. Reena Ramachandran

Prof. M Sharan

Finance Committee*Chairman*

Dr. PS Goel

Members

Dr. K Kasturirangan

Dr. A Ramakrishna

Dr. MJ Zarabi

Dr. Baldev Raj

Prof. Sudhir K Jain

Capt NS Mohan Ram

JS&FA, DST

Forum on Engineering Education*Chairman*

Prof. Prem Krishna

Co-Chairman

Prof. R Natarajan

Members

Dr. RK Bhandari

Dr. G Sundararajan

Prof. Sankar K Pal

Prof. Amitabha Ghosh

Mr. SA Reddi

Prof. ES Dwarakadasa

Prof. RK Mallik

Programme Committee

Chairman

Dr. Baldev Raj

Members

Dr. RK Bhandari

Prof. B Yegnanarayana

Prof. J Nanda

Mr. SS Chakraborty

Prof. PR Mahapatra

Dr. Purnendu Ghosh

Dr. KV Raghavan

Prof. AK Ghose

Prof. Ashok Misra

Steering Committee - Research Schemes/Proposals

Chairman

Dr. MJ Zarabi

Members

Prof. Prem Krishna

Dr. Baldev Raj

Dr. N Sitaram

Prof. AK Ghose

Prof. AB Bhattacharyya

Dr. BN Suresh

Prof. J Nanda

Steering Committee - AICTE-INAE Distinguished Visiting Professorship Scheme

Chairman

Dr. Baldev Raj

Project Coordinator

Prof. Sneha Anand

Members

Prof. Prem Krishna

Prof. AK Ghose

Prof. MR Madhav

Mr. MC Tandon

Dr. VM Sharma

Prof. PK Dash

Convener

Brig SC Marwaha

ENGINEERING EXCELLENCE AWARDS

Selection Committee – Life Time Contribution Award in Engineering

Chairman

Dr. PS Goel

Members

Dr. Baldev Raj

Prof. Prem Krishna

Dr. MJ Zarabi

Selection Committee - Young Engineer and Innovative Student Projects Awards

Chairman

Prof. Prem Krishna

Members

Dr. MJ Zarabi

Prof. AK Ghose

Prof. BC Nakra

Prof. S Narayanan

Prof. B Yegnanarayana

Prof. PK Dash

Prof. DV Khakhar

Mr. AK Anand

Prof. NGR Iyengar

Mr. KK Sinha

Prof. J Nanda

Prof. PP Chakrabarti

Dr. BN Suresh

**Selection Committee - Professor Jai
Krishna Memorial Award and Professor
SN Mitra Memorial Award**

Chairman

Dr. PS Goel

Members

Dr. Baldev Raj

Prof. Prem Krishna

Dr. MJ Zarabi