



# 35<sup>th</sup> Indian Engineering Congress

December 18-20, 2020

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**Engineering for  
Self Reliance and  
Sustainable Goals**



Organized by

**The Institution of Engineers (India)**

**Online Platform**



# *Invitation*

## *to participate in 35th Indian Engineering Congress*

The Indian Engineering Congress organized every year by the Institution through its various State or Local Centres is a flagship and significant event which provides a broad platform to the engineering and technical fraternity from within the country as well as from abroad for creating an interaction and transfusion of knowledge that would evolve a new dimension for technological development for the benefit of the society and the country.

A prosperous India for its entire people and for future generations requires that all professionals, not only engineers, execute their professional duties ethically and enhance the profession of engineering in India through its practice, research and education with the objective of accelerated nation building. More than any other profession, we Engineers have to become change agents and prime movers in transforming India to a developed country through its relentless journey towards Engineering Advancement for Nation Building.

Due to the ongoing pandemic situation, we are constrained to convert the 35th Indian Engineering Congress as a virtual affair and I am sure that there will be no dearth of enthusiasm among the fellow engineers in attending the event using their computer or mobile phone.

The theme “Engineering for Self Reliance and Sustainable Goals” is very apt in the present day scenario and I am confident, the deliberations at this mega event, to be shared by visionaries and doyens in the field of engineering will enlighten us and generate awareness about the responsibility of the engineers in promoting engineering innovation and accelerating growth of the nation in all sectors.

I cordially invite you join the Congress to make it a grand success.

Er Narendra Singh, FIE  
President  
The Institution of Engineers (India)





## Relentless Journey towards Engineering Advancement for Nation Building since 1920

The Institution of Engineers (India) [IEI] is a statutory body to promote and advance the engineering science and technology, established in 1920 and incorporated by Royal Charter in 1935. It is the largest multi-disciplinary professional body of engineers encompassing 15 (fifteen) engineering disciplines with a membership of more than 0.8 million, and serving the nation for more than 9 decades. The IEI has its headquarters located in Kolkata and it function through more than hundred Centers and several Overseas Chapters, Foras and Organ. Besides, IEI has bilateral agreements with about 33 international bodies and membership of another eight international bodies of the developed nations across the globe. Being recognized as a Scientific and Industrial Research Organisation (SIRO) by the Department of Scientific and Industrial Research, Ministry of Science and Technology, Government of India, IEI promotes the cause of research and development by providing Grant-in-Aid support to Undergraduate, Post Graduate Students and Ph.D. Research Scholars of Engineering Institutions and Universities.

In order to create sharp focus on National priority areas, The Institution of Engineers (India) has established the following Organ and Fora to work in close co-operation with the stake holders in the respective fields.

- **Engineering Staff College of India (ESCI)**, Hyderabad for providing continuing education and Research & Development, is an autonomous Organ of IEI
- **National Design and Research Forum (NDRF)**, Bangalore to encourage design talents in engineering and technology
- **National Skill Development Forum (NSDF)**, Shimla to enhance skill of engineering and technical personnel
- **Rural Development Forum (RDF)**, Kolkata to encourage and promote multifaceted development of rural India
- **Safety and Quality Forum (SQF)**, New Delhi to address the aspects of Safety and Quality in Engineering Profession
- **Sustainable Development Forum (SDF)**, Patna for expression of authoritative views on technologies for sustainable development and for enunciating practical solutions to the problems faced by India
- **Water Management Forum (WMF)**, Ahmedabad to promote and advance the engineering and practice of water resources management in its totality.

IEI conducts Section A & B Examinations in various engineering disciplines (popularly known as AMIE examination), the successful completion of which is recognized as equivalent to Degree in appropriate field of Engineering. Every year as a large number of candidates appear for these exams. IEI in collaboration with Springer regularly publishes peer-reviewed International Journal in five series, namely, Series A, Series B, Series C, Series D and Series E covering 15 engineering disciplines, which are **Scopus Indexed**.

For further details, please visit: [www.ieindia.org](http://www.ieindia.org)

## History of Indian Engineering Congress

The Institution of Engineers (India), was earlier holding Annual General Meetings / Annual Sessions / Annual Conventions at different places in the country to take stock and review its activities and objectives. The Annual Convention later manifested into Indian Engineering Congress is intended to broaden the scope of interaction and transfusion of knowledge amongst engineers from the country as well as from the prominent parts of the globe. The Institution of Engineers (India) is organizing the Indian Engineering Congress every year to cater the needs of entire engineering professional community of India. The Indian Engineering Congress will throw open the threshold of knowledge to all members and non-members and provide them with a Forum.

The First Indian Engineering Congress was inaugurated by the then Prime Minister of India, Bharat Ratna Late Shri Rajiv Gandhi in 1987 in Kolkata. The then Hon'ble Chief Minister of Andhra Pradesh Shri N Chandrababu Naidu inaugurated the 15th Indian Engineering Congress held at Hyderabad in 2000. It is a matter of great honour that Late Shri Pranab Mukherjee, Hon'ble President of India inaugurated the 27th Indian Engineering Congress in New Delhi (2012) and 28th Indian Engineering Congress in Chennai (2013). Hon'ble Governor of Telangana & Andhra Pradesh, Shri E S L Narasimhan inaugurated the 29th Indian Engineering Congress held at Hyderabad in 2014, Hon'ble Governor of Tripura, Shri Tathagata Roy inaugurated the 30th Indian Engineering Congress held at Guwahati in 2015, Hon'ble Governor of West Bengal, Shri Keshari Nath Tripathi inaugurated the 31st Indian Engineering Congress held at Kolkata in 2016, Hon'ble Governor of Telangana, Dr Tamilisai Soundararajan inaugurated the 34th Indian Engineering Congress held at Hyderabad in 2019.

## Theme of the Congress

### Engineering for Self Reliance and Sustainable Goals

Self-reliance and sustainable development are associated with each other. These two do care for the welfare of the human well-being, the basic needs of the poor, the prospects of the future generations and preservation of environmental resources. The two key imperatives for achieving sustainable goals include; the first, there is a need to internally identify and adopt realistic indicators of sustainability to steer and guide development in

## Aim of the Congress

The aim of the Indian Engineering Congress is to enlighten the technical fraternity about the developments in various fields of Engineering and thereby enabling them to face the future challenges and ensure development of the nation.

## Congress Objectives

The Congress will provide a Forum:

- To have discussion around the theme to promote ideas, broaden operational horizon of engineers from different disciplines, and to pursue newer domains and concepts
- For exchange of information, updating knowledge and stimulating a sense of responsibility in their professional work
- To foster international and national co-operation in the engineering fields
- To inculcate and promote a growing commitment to the social objective of the profession
- To promote engineering practices that lead to sustainable development

India. Secondly, there is an urgent need for institutional reforms to achieve self-reliance situation in the country. Government of India has been taking several steps to ensure that we are well prepared to face the challenges and threats posed by COVID-19. India has faced the COVID-19 situation with fortitude and a spirit of self-reliance that is evident in the fact that from zero production of Personal Protection Equipment (PPE) before March 2020, India today has created a capacity of producing 0.2 million PPE kits daily, which is also growing steadily. However, engineers of the country have to come forward to give engineering solutions of the complex problems like COVID-19 being faced by the country. The clarion call given by the Hon'ble Prime Minister of India to use these trying times to become self-reliant has been very well received to enable the resurgence of the Indian economy.

The Indian engineering community subscribes to the above philosophy and has done itself proud. The ultimate goal of self-reliant India should be reduction of poverty and livelihood development through equitable pursuit of prosperity. The engineering community will harness and manage the natural resources with equity lens and demand level-playing field.

The country has the resources, the institutions and the mindset too. Engineers do need to work towards a fusion of our positive achievements. This is the essential condition for India's path towards self-reliance and emergent role in global engineering and technology. With the seamless engineering and technology capabilities, tempered by the social and political systems, Indian engineers can be the harbinger to the development of the sustainable economy of the country in the post-pandemic regime.

This congress will provide platform to the researchers, academicians, R&D professionals, policy makers, industry players, young engineering talents to address the critical relationship between self-reliance and sustainable goals. The combination of self-reliance and sustainable development goals will have a positive impact on human capital development.

### **Sub-themes:**

- Design and Engineering for a Self-reliant Society
- Sustainable Manufacturing: Principles, Applications and Directions
- Managing Risk and Uncertainty in Engineering Design and Application
- Adaptive Technology for Human capital development
- Engineering Innovations, Incubation (Start-up) and Entrepreneurship for a Self-reliant Country
- Innovative Hybrid Teaching Methodologies for Engineering and Technical Education
- Enhancing Skill, Quality and Safety for a Self-reliant Country
- Role of Technical Higher Education - National Education 2020 Perspective



## Call for Papers

Engineering professionals from Industries, Academic Institutions, Research & Development Organisations, Government Departments and Entrepreneurs are invited to contribute papers pertaining to the theme and sub-themes of the Congress under each of the following 15 engineering disciplines of IEI.

The papers should focus on sharing the experience, concepts, innovative ideas, research findings etc.

- Agricultural Engineering (AG)
- Architectural Engineering (AR)
- Civil Engineering (CV)
- Environmental Engineering (EN)
- Computer Engineering (CP)
- Electrical Engineering (EL)
- Electronics & Telecommunication (ET)
- Aerospace Engineering (AS)
- Marine Engineering (MR)
- Mechanical Engineering (MC)
- Production Engineering (PR)
- Chemical Engineering (CH)
- Metallurgical & Materials Engineering (MM)
- Mining Engineering (MN)
- Textile Engineering (TX)
- Interdisciplinary (ICC)

The above areas are indicative. Authors may also submit papers on other areas based on the main theme of 35th Indian Engineering Congress.

Four Technical Sessions will be conducted covering all the Sub-Themes. Invited Lectures will be delivered by eminent professionals of International and National repute in the respective field. Technical papers will be published in the Proceeding of the Congress with ISBN number.

## Submission of Synopsis / Full Text

The authors are requested to submit the synopsis and full text through e-mail to :  
iectech@ieindia.org

## Nodal Dates

Last date of submission      November 25, 2020

Intimation to authors regarding session details      1st Week of December, 2020

**“Centenary Certificate” will be provided to all paper presenters whose papers will be accepted. The first three best papers in each engineering division will also be awarded.**

## Guidelines for Authors

Authors intending to submit a paper for 35th Indian Engineering Congress are advised to adhere to the guidelines as mentioned below. The papers not conforming to these guidelines may not be considered for review / publication. The full text of accepted papers will be published in the e-Proceeding of 35th Indian Engineering Congress (with ISBN No.).

The Synopsis of Paper within 500 words with maximum six keywords has to be submitted in Times New Roman, Font size 14 with 1.5 spacing along with the full length paper has to be submitted as per the Template.

Papers will be reviewed by domain experts and the decision will be communicated to those authors whose papers are accepted.

## Preparation of Full Text of Paper

1. Papers should be camera-ready in MS-Word format, not exceeding 3000 words in length and should not carry more than 5 illustrations / photographs.
2. The language of the Publication is English. The mode of presentation should be in third person.
3. The Template for preparation of article is attached for ready reference of the authors.
4. SI units should be used wherever applicable. Other units, if used, should be given only in parentheses preceded by SI units.
5. Mathematical symbols should be typed and care should be taken to differentiate between similar characters (e.g. 1 and l), upper and lower case letters and superscripts and subscripts.
6. Lengthy mathematical proofs and derivations and extensive test data should be given as an appendix.
7. The Template of Paper can be downloaded from the link: [https://www.ieindia.org/webui/IEI-Activities.aspx#Call\\_Papers](https://www.ieindia.org/webui/IEI-Activities.aspx#Call_Papers)

## Copyright

The papers are considered for possible publication on the understanding that these have not been submitted to any other publisher. The copyright of papers accepted for publication lies with The Institution of Engineers (India) and reproduction of the papers or any part thereof is not allowed without the permission of the Institution. Contributors are required to sign a declaration to this effect while submitting their papers.

As per Bye-Law 118 of IEI, Copyright of each paper published in Institution Journals or Proceedings in full or in Abstract at its Centres shall lie with the Institution.

The Declaration Form of IEI can be downloaded from the link: [https://www.ieindia.org/webui/IEIActivities.aspx#Call\\_Papers](https://www.ieindia.org/webui/IEIActivities.aspx#Call_Papers)

## Registration

Corresponding / Presenting Author(s) has to register themselves for 35th Indian Engineering Congress. Details will be conveyed in due course. There is no Registration Fee for 35th Indian Engineering Congress.

## Contact for Submission of paper

Dr Nilanjan Sengupta, FIE  
The Convener  
Technical Committee  
35th Indian Engineering Congress &  
Director (Technical), The Institution of  
Engineers (India), 8 Gokhale Road, Kolkata  
700020  
Email: [iectech@ieindia.org](mailto:iectech@ieindia.org)

## Memorial Lectures

Following eight Memorial Lectures have been instituted by IEI to commemorate the outstanding engineers. These lectures form an important part of the Congress:-

- The 63rd Sir Mokshagundam Visvesvaraya Memorial Lecture
- The 55th Nidhu Bhushan Memorial Lecture
- The 46th Bhaikaka Memorial Lecture
- The 42nd Sir Rajendra Nath Mookerjee Memorial Lecture
- The 33rd Dr Ajudhia Nath Khosla Memorial Lecture
- The 29th Dr Amitabha Bhattacharya Memorial Lecture
- The 10th Prof C S Jha Memorial Lecture
- The 6th Dr K L Rao Memorial Lecture

## Visionary Talks

It is an important part of the Congress. Very eminent visionaries in three or four vital areas of engineering will be invited to deliver the talks on the future of the engineering and technology in the years ahead.

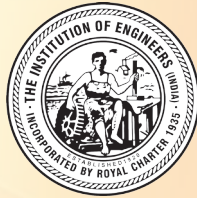
### Tentative Programme

<b>DAY : 1</b> <b>18</b> <b>December</b> <b>2020</b>	10.00 h – 11.30 h	<b>INAUGURAL SESSION</b>			
	10.00 h- 10.05 h	Invocation			
	10.05 h – 10.15 h	Welcome Address by	:	President, IEI (preside over)	
	10:15 h – 10:25 h	Address by	:	Guest of Honour	
	10:25 h – 10:55 h	Keynote Address	:	Key-note speaker	
	10.55 h –11:25 h	Inaugural Address by	:	Chief Guest	
	11.25 h –11:30 h	Vote of Thanks	:	SDG –I/C	
	<b>Technical Sessions (Morning)</b> <b>[Four parallel sessions]</b>				
	11:45 h – 12.45 h	Technical Session-1A	Technical Session-1B	Technical Session-1C	Technical Session-1D
	13:00 h - 14:00 h	Technical Session-2A	Technical Session-2B	Technical Session-2C	Technical Session-2D
14.00h -14.30 h	<b>LUNCH BREAK</b>				



DAY : 1 18 December 2020	Technical Sessions (Evening) [Four parallel sessions]				
	14:30 h – 16:00 h	Technical Session-3A	Technical Session-3B	Technical Session-3C	Technical Session-3D
	16:30 h – 18:00 h	Technical Session-4A	Technical Session-4B	Technical Session-4C	Technical Session-4D
DAY : 2 19 December 2020	10:00 h - 10:30 h	<b>63rd Sir Mokshagundam Visvesvaraya Memorial Lecture</b> Chair of the Session: President, IEI Introduction of the Speaker: SDG-I/C <b>Speaker :</b>			
	10.45 h – 11.15 h	<b>Visionary Talk -1</b> Chair of the Session: President, IEI Introduction of the Speaker: SDG-I/C <b>Speaker :</b>			
	11:30 h – 12:00 h	<b>55th Nidhu Bhushan Memorial Lecture</b> Chair of the Session: President, IEI Introduction of the Speaker: SDG-I/C <b>Speaker :</b>			
	12:15 h – 12:45	<b>Visionary Talk -2</b> Chair of the Session: President, IEI Introduction of the Speaker: SDG-I/C <b>Speaker :</b>			
	13:00 h - 13:30 h	<b>46th Bhaikaka Memorial Lecture</b> Chair of the Session: President, IEI Introduction of the Speaker: SDG-I/C <b>Speaker :</b>			
	13.30 h -14.00 h	<b>LUNCH BREAK</b>			
	14.00 h -14.30 h	<b>42nd Sir Rajendra Nath Mookerjee Memorial Lecture</b> Chair of the Session: President, IEI Introduction of the Speaker: SDG-I/C <b>Speaker :</b>			

<b>DAY : 2</b> <b>19</b> <b>December</b> <b>2020</b>	14.45 h- 15.15 h	<b>Visionary Talk -3</b> Chair of the Session: President, IEI Introduction of the Speaker: SDG-I/C Speaker :		
	15.30 h – 16.00 h	<b>33rd Dr Ajudhia Nath Khosla Memorial Lecture</b> Chair of the Session: President, IEI Introduction of the Speaker: SDG-I/C <b>Speaker :</b>		
	16.15 h -16.45 h	<b>29th Dr Amitabha Bhattacharya Memorial Lecture</b> Chair of the Session: President, IEI Introduction of the Speaker: SDG-I/C <b>Speaker :</b>		
	17.00 h – 17.30 h	<b>Visionary Talk - 4</b> Chair of the Session: President, IEI Introduction of the Speaker: SDG-I/C <b>Speaker :</b>		
<b>DAY : 3</b> <b>20</b> <b>December</b> <b>2020</b>	10:00 h – 10:30 h	<b>10th Prof C S Jha Memorial Lecture</b> Chair of the Session: President, IEI Introduction of the Speaker: SDG-I/C <b>Speaker :</b>		
	10:45 h – 11:15 h	<b>6th Dr K L Rao Memorial Lecture</b> Chair of the Session: President, IEI Introduction of the Speaker: SDG-I/C <b>Speaker :</b>		
	11:45 h – 12:30 h	<ul style="list-style-type: none"> <li>• <b>Release of Centenary Publication and</b></li> <li>• <b>Centenary certificate distribution</b></li> </ul>		
	12.30 h – 13.30 h	<ul style="list-style-type: none"> <li>• <b>VALEDICTORY SESSION</b></li> </ul>		
	12.30 h – 12.45 h	Welcome Address by	:	President,IEI (preside over)
	12.45 h – 13.15 h	Address by	:	Chief Guest
	13.15 h -13.25 h	Vote of Thanks	:	SDG-I/C
<b>NATIONAL ANTHEM</b>				



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