NATIONAL AWARD
COMPETITION FOR STUDENTS
2019 - 2020

Civil/Structural Engineering Students
For Best Innovative Structural Steel Design

Competition Theme:
Steel Intensive Quarantine Center Building for COVID-19

Institute for Steel Development & Growth
THE INSTITUTE
The Institute for Steel Development and Growth (INSDAG) is a non-profit making member based organization, promoted and established at Kolkata by the Ministry of Steel, Government of India and the main steel producers of the country. Some of the major roles of the Institute are: awareness about benefits of steel and steel usage; preparing guidebooks, handbooks to facilitate cost effective design and construction by professionals; upgrading competence and skills of professionals by organizing refresher courses/ training; communicating the benefits of steel vis-à-vis other competitive materials through life cycle cost studies etc.; regular interaction with Bureau of Indian Standards, Indian Road Congress and RDSO (Railways) for expediting revision in steel related codes for efficiency and cost effectiveness; providing requisite thrust to increased usage of steel and a host of other activities.

THE COMPETITION
This National Level “Competition for Civil / Structural Engineering Students for Best Innovative Structural Steel Design” organized by INSDAG is entering into 20th consecutive year. This Competition aims at enkindling the thoughts and skills of the students to come up with efficient designs reiterating the multifarious advantages of steel intensive construction such as flexibility in design, economic and ecological benefits, speedy construction, cost effectiveness, life cycle cost benefit etc. Owing to the keen interest generated among the students, INSDAG is pursuing the task of arranging an interesting and challenging competition every year for the students of Civil/ Structural Engineering studying in the Colleges all over India with a view to recognize, appreciate and finally reward the talents of would-be Civil / Structural Engineers for “Excellence in Structural Steel Design”

THE BRIEF
The Brief on the subject of the Competition is available in this brochure along with the Announcement.

THE PRIZE
1st Prize (1 no.) : ` 45,000/- + Certificate
2nd Prize (2 nos.) : Each ` 30,000/- + Certificate
3rd Prize (2 nos.) : Each ` 20,000/- + Certificate
Participation certificate will be provided to all the eligible participants.

ELIGIBILITY
The “Competition” is open to all the final year/pre-final year Civil/Structural Engineering Students (individual participant/a group of maximum four students) from any AICTE approved University/Engineering College in India offering Full Time Undergraduate Degree Courses. Students studying Full Time Post Graduate Course in Civil/Structural Engineering can also participate as an individual participant or in a group with a maximum of three other final year/pre-final year Undergraduate Civil/Structural Engineering Students.

THE SELECTION
Four Zonal Selection Committees (one each from the East, West, North and South Zones) consisting of renowned academics and professional engineers are entrusted the task of preliminary screening of the entries received in each zone. In this Initial Round, 16 (sixteen) best entries will be selected (four from each zone) based on overall merit of the proposals, in accordance with the criteria formulated by the Committees. Sixteen individuals/groups of the short listed entries will be invited to Kolkata to display and present important aspects of their entry before the Central Selection Committee during the Final Round of Competition expected to be held around November – December 2019. The top five proposals will receive the Prizes.

ENTRY / APPLICATION
The last date of receiving of Expression of Interest (EOI) is 30th October 2020 and final Entry for the Zonal Round of Competition is 30th November, 2020. The Expression of Interest (EOI) shall be sent to INSDAG, Kolkata and the entries shall be directly sent to the respective Zonal Coordinators at the addresses mentioned hereafter with intimation to INSDAG, Kolkata.
The Zonal Coordinators

NORTH ZONE (J&K, Punjab, NCR, Haryana, UP, MP, Uttarakhand, HP)
Dr. Veerendra Kumar, Professor
Civil Engineering Department
IIT- BHU, Benaras Hindu University Campus
UttarPradesh - 221005
Email: vkumar.civ@iitbhu.ac.in
vkumar1655@yahoo.co.in

SOUTH ZONE (Kerala, TN, AP, Telengana, Karnataka)
Dr. R. Senthil,
Professor & Head
Department of Civil Engineering
Anna University, Chennai -600025
Email: senthilr68@gmail.com

EAST ZONE (WB, Bihar, Jharkhand, Odhissa, Assam, Chhattisgarh, Tripura, Meghalaya, Manipur, Arunachal Pradesh)
Dr. Saroj Mandal, Professor & Former Head
Department of Civil Engineering
Jadavpur University, Kolkata-700032, West Bengal
Email: saroj.mandal@jadavpuruniversity.in,
mailto:sarojmandal@rediffmail.com

WEST ZONE (Rajasthan, Gujarat, Maharashtra, Goa)
Prof. S D Bharti, Professor
Department of Civil Engineering
Malaviya National Institute of Technology Jaipur,
JLN Marg, Jaipur-302017 (India)
Email: sdbharti@mnit.ac.in

Expression of Interests (EOI) and Intimation for Submission to INS DAG shall be made to the following address:
Institute for Steel Development & Growth
‘ISPAT PRAGATI BHAWAN’
793, Anandapur, Kolkata - 700107
Phone : 033-24434045 / 47; 033-2443 4409
Email: ins.steel@gmail.com; insdag@rediffmail.com
Coordinator: Arijit Guha /Nibedita Dey
(9830566354)

SUBMISSION
The participants are advised to send their entries in soft copy containing the following:
1. General Arrangement and Design drawings showing Plan, Elevation and Sectional views highlighting the structural systems of the proposed structure (Scale of Detail view should be less than 1 : 10).
2. Detail drawing(s) showing Structural Steel details: truss members, beams, columns, claddings, etc. in accordance with ‘Design scope’. All drawings should be drawn in AutoCAD or similar software.
3. Drawing sizes should be A3 only and should be Presented in hard and soft copies (PDF).
4. Design calculations (A4 size paper) should be complete in all respect and neatly presented. Use of standard analysis software STADD, ETAB, SAP etc. is desirable.

Design checks for the selected sections (atleast one from each type) shall be presented manually preferably in Excel spreadsheets. Analysis of at least one frame/truss must be done in 2D in case of plane framed structure. Connection design and detail sketches must be submitted.
5. All computer input and output files are to be submitted in soft form only.
6. A brief write-up (Max. 2000 words, duly typed on A4 size paper) on the work (consisting of considerations/assumptions, description of the proposal, highlights/special features, etc.) duly authenticated by HOD/Principal shall be submitted.
7. Preparations of Perspective views, walkthroughs (videos) are not required and will not carry any marks.
8. A brief resume of the student(s) / applicant(s) containing name, address, phone / fax / e-mail, name of University / College, year of study and registration / roll number of the participant(s), and recent passport-size photographs (for each participant) should be submitted in soft copy only.
9. A certification from the Principal / HOD / Registrar of his / her Institute on office pad declaring bonafides under office seal / stamp should also be submitted (scan copy).

OTHER RULES
1. To be eligible for participation in the Competition it is essential for each student to enroll himself/herself as a student member of INSDAG before submitting application/entry to the respective Zonal Coordinators.
2. Originality of work is essential and the application will be disqualified, if found otherwise.
3. The decision of the Expert Committees will be final and binding. Canvassing in any form will lead to disqualification.
4. Outstation (Institutions situated outside greater Kolkata) candidates appearing for the Final Round of Competition at Kolkata will be reimbursed with to-and-fro Air Conditioned (AC) 3-Tier/Chair Car Rail Fare by the shortest route on production of proof of travel. Accommodation in Guest House/Hotel will be considered depending upon availability.
5. Family members and relatives of Expert / Selection Committee and INSDAG Employees are debarred from taking part in this Competition.
6. All the entries/proposals received by INSDAG at all stages of the above Competition will be treated as property of INSDAG and will not be returned to the participants. Moreover, INSDAG will not take any responsibility in case of missing of any documents/communications from any side while in transit.
INTRODUCTION
In present pandemic condition, when the nos. of COVID-19 positive people are increasing in a high rate, increased numbers of quarantine centre become very necessary to separate and restrict the movement of people who are exposed to contagious COVID-19 affected people.

APPOINTMENT AS CONSULTANT
INSDAG wishes to provide most economical solution of a modular quarantine centre building with faster construction facility and all relevant design and detail drawings thereof, to the client. Considering that you have been appointed as a structural consultant for this project and have been asked to furnish structural solution for “Steel Intensive Quarantine Center Building for COVID-19”, the task is to prepare a report that should have the following scope:

1. Development of an Economical structural scheme within the specified requirement with faster construction facility.
2. Structural design engineering and Detail drawings for the developed structural scheme.
4. Possible time of construction

FACILITIES
Client/Architect has specified the following requirements for the proposed project:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Specification</th>
</tr>
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<tbody>
<tr>
<td>1. Site Location</td>
<td>Kolkata, West Bengal</td>
</tr>
<tr>
<td>2. Area of Building</td>
<td>50 m × 35 m. See the schematic Plan.</td>
</tr>
<tr>
<td>3. Minimum Eves height</td>
<td>7 m</td>
</tr>
<tr>
<td>4. Roof Structure</td>
<td>To be covered with Colour Coated Steel Sheet</td>
</tr>
<tr>
<td>5. Building Type</td>
<td>Naturally ventilated</td>
</tr>
<tr>
<td>6. Minimum spacing of internal column</td>
<td>6 m</td>
</tr>
</tbody>
</table>

MATERIALS FOR CONSTRUCTION

<table>
<thead>
<tr>
<th>Material</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Foundation system</td>
<td>R.C.C. of minimum grade M25</td>
</tr>
<tr>
<td>2. Structural members like columns, beams, members and bracing systems</td>
<td>Structural steel of mild steel (grade E250) or Yst 310/355 or high tensile steel (grade E350 / E410</td>
</tr>
<tr>
<td>3. Roof &amp; Cladding</td>
<td>Standard Colour Coated Steel Sheet (Galvalume)</td>
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STANDARD SHAPE OF THE STRUCTURE
While considering the shape and arrangement of the Structure, aesthetics, economy as well as structural integrity of the entire system has to be considered.

DESIGN LOADS
1. Dead Load:
   Dead load will be the weight of the structure itself along with all permanent weight carried by it.
2. Live Load:
   a. Live load on Roof - as per IS: 875 Part 2 –1987
   b. Live Load on Deck - 750 kg/m2 for food grains/vegetable/fruits etc. / 400 kg/m2 on passage
3. Wind Load:
   Basic wind speed to be considered as per IS: 875 Part 3 – 2015 (Please check against Jalapaiguri).
4. Seismic Load:
   Seismic zone as per IS: 1893 Latest version (Please check against Kolkata).
5. Temperature Load:
   Temperature variation of 15°C has to be considered. Please consult relevant specification for other load and action points.
GUIDELINES
The following guidelines should be taken into consideration:

1. Items designed in accordance with design scope, should be checked for axial, bending, bearing stresses etc. as applicable. Equivalent stresses and any other stresses necessitated by the relevant codes should also be calculated.
2. Deflection calculated should be within stipulations given in relevant IS code.
3. For designing of Base Plates and Foundation Bolts, grade of concrete to be considered as mentioned above.
4. For foundation design consider Safe Bearing Capacity as 200.0 kN/m2 at 3.0m from GL. No tension in bearing pressure due to uplift for DL+WL condition is allowable.
5. While selecting the steel sections for use, please refer INSDAG website or any manufacturer’s website for availability.

DESIGN SCOPE
For designing the building, the following scope of work needs to be undertaken:

1. Layout Plan, Elevation and Sectional views should show the arrangement facilities provided.
2. Beams & Columns: Sections, such as MB/MC [refer IS 808-1989(2004)], built-up sections or Parallel Flange sections [refer IS 12778-2004], Tubular Sections [refer IS 1161 – 1998 and IS 4923 – 1997] will be preferred.
4. Connections: All connections shall be either welded connection or bolted connection using mild steel or high tensile black bolts, turned bolts or HSFG bolts.
5. The design and detailing of the following items shall be done:
   a. Analysis of the structure in 2D or 3D as applicable.
   b. Foundation System
   c. All Columns and Girders/Beams
   d. All Truss members, Posts, Purlins and Girts
   e. All Bracings, Struts and cables/steel ropes.
   f. Connection designs for Critical joints
   g. Any other members conceived in the scheme.
6. Bill of Materials: A bill of materials (in A4 sheet) should be prepared for all items under design scope to determine the quantity of materials required.

EXCLUSIONS
Structural bearings for supports and all allied services like electrical fittings.

DESIGN STANDARDS

1. Design
   • Steel design - As per IS: 800 – 2007
   • Concrete design - As per IS:456- 2000
   • Live load - As per IS: 875 Part 2 - 1987
   • Wind load - As per IS: 875 Part 3 - 2015
   • Seismic load - As per IS: 1893 (Latest revision)

2. Material
   • Rolled sections and plates - As per IS: 2062 - 2011
   • SHS/RHS - As per IS: 4923 - 1997
   • CHS - As per IS: 1161 - 1998

3. Welding
   • Symbols for welding - As per IS: 813- 1986
   • Weld joint details - As per IS: 9595-1996
Checklist for Submission

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Content page for report and all submissions</td>
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<tr>
<td>2</td>
<td>All pages and drawings are to be numbered</td>
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<tr>
<td>3</td>
<td>All soft copies are submitted on a CD (i.e. drawings, input and output files of analysis, excel spreadsheets for design checks etc). Soft copies should be sent the zonal coordinator through email also.</td>
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<tr>
<td>4</td>
<td>No Hard copy report is required in preliminary round (Considering COVID-19 Pandemic situation).</td>
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<tr>
<td>5</td>
<td>Scan copy of Bonafide certificate.</td>
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<tr>
<td>6</td>
<td>Student details along with photos in soft copy.</td>
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Visit us at www.steel-insdag.org
The Announcement and the Brief of this year’s Competition is also available at INSDAG website for free downloading.
What They’re Saying

“Because of this competition I have come to know about real industrial problem and how can we connect our real-world problems with academic problems.”
Keval Modi, Nirma University

“Problem was so challenging that it helped me a lot in enhancing my practical skills and introduced me to art of efficient steel design.... each mistake I did in the project, taught me a lot about the steel design, which is versatile and being demanded these days.”
Jinka Lakshmi Narayan, SASTRA University, Thanjavur

“Reaching the INSDAG award final has added valuable CV points, which helped my team members to get placed in core sectors....however, my decision to pursue MTech in Structural Engineering was influenced by INSDAG.....I always wanted to become an entrepreneur and so used INSDAG Competition Project to hone my technical skill.”
Debarshi Sahoo, KIT University, Bhubaneswar

“Currently, I am associated with M/s Systra as an Assistant Engineer - Bridges and finding myself comfortable with steel design issues, because of practical exposure I got during design INSDAG project.”
Shaurya Shah, Nirma University

“At one point, I used to fear the subject - designing steel structures. INSDAG gave me the opportunity to overcome that fear by providing me the confidence to face real life problem.”
Chirag Jain, VJIT, Mumbai

“INSDAG competition provided us a national platform to know about the importance of steel in infrastructure construction & acquire in-depth knowledge of analysis & design of real life steel structures. We also learnt about diverse applications of steel and use of structural softwares adequately.”
Thanushree N, Sri Siddhartha Institute of Technology, Tumkur

“DON’T JUST LEARN, EXPERIENCE! - These words truly depict my journey with INSDAG Civil Award Competition.”
Sindhu D M,

“We did realize practical design issues are vastly different from theoretical discourse. Overall the competition rigor prepares students adequately for their professional journey ahead.”
Arnab Paul, IIEST, Shibpur

“We were exposed to intricate design processes: modelling, stability of structure, materials availability, connections, applicability of codes etc. which would not have been possible via classroom study.”
Aditya Raj, IIT Kanpur
Steel, the backbone of modern construction is evolving continuously at the material, member and structure levels to cater to the various issues faced by the planet in terms of lifecycle, environment and robustness. Students, who keep up-to-date with the new developments will have a bright future in the Construction Industry.

Prof S Sathish Kumar - IITM

INSDAG competition kindles budding civil engineers to comprehend leaning and applying same to real time project. Participating students have the opportunity to link the knowledge on the structural system, force flow, design effects and effective steel design and can inculcate their creativity.

Prof S Arul Mary – TCE-Madurai

INSDAG competition focuses on evolving nature of steel design and construction in India. Students also get the practical insight of safety and economy of steel based infrastructure design.

Somnath Mukherjee – Technical Director & HOD – Structural M N Dastur & Co, Kolkata

INSDAG competitions have remained the best ones to encourage students of civil engineering and architecture in steel structures.

Prof Siddhartha Ghosh – IITB

If you step forward to participate in the INSDAG Civil Award at the budding stage, you will always be a step ahead in some form in future.

Prof Saroj Mandal – Jadavpur University