

**SAEINDIA**

STUDENT  
CONVENTION  
RULE BOOK

2022 -23

**SAEINDIA**  
SOUTHERN SECTION



### SAEISS STUDENT CONVENTION RULEBOOK 2022-23

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# 1. Modeling and Kinematic check

## Purpose of the event

- Modeling and Kinematically check a given assembly or mechanism through a solid modeling software ( Creo, CATIA, SolidWorks). The possible assemblies are as details in the sections below.

## Eligibility Criteria – participants

- Must have SAEINDIA membership
- Must have basic knowledge on kinematics
- Must have basic software knowledge

## Alignment with curriculum

- Converting a drawing/ illustration into part.
- Physical linkages.
- Materials and their properties.
- Kinematics behavior of mechanism.

## Expected skills

Tier-1	Tier-2	Tier-3
Creation of solid model/assembly and their relative movements prediction of area, volume and mass.	Explain the function of an assembly through animation to demonstrate the various degrees of freedom.	Define and explain the math model behind the functioning of the part and assembly and check for the Kinematic response for variation of parameters in the model.

S.no	Division Centre	Topic
1	Chennai division	Engine and subsystems
2	Mahindra World City Division	Transmission (gear box ,clutch ,rear axle etc.)
3	Coimbatore Division	Steering system and components
4	Madurai Division	Seating and door systems
5	Hyderabad Division	Braking system and components
6	Cochin	Transmission (gear box ,clutch ,rear axle etc.)

7	Amaravati	Suspension system and components
8	Erode	Engine and subsystems
9	Thirunelveli	Braking system and components
10	Hosur	Seating and door systems
11	Thanjavur	Suspension system and components
12	Orgadam	Steering system and components

### Kits and aids

- Creo , CATIA, SolidWorks etc.,

### Competition rules

- Actual modeling/assembly done offline
- Participant should provide proof that it was done by the participants
- 10 min Presentation at the competition
- Animation video to be submitted
- Models must be done using Creo, CATIA, and SolidWorks software.
- Individual colleges will follow the topics allocated to their divisions.

### Team Size

- Team size: 3 students
- Number of teams for Tier-1: as many as possible
- One team from each college moves to Tier-2 (Division level)
- First two teams from each division moves to Tier-3(Convention)

## Judging criteria

Tier-1	Tier-2	Tier-3
Quality of solid models - 40%	Quality of solid models - 30%	Quality of solid models - 20%
Prediction of area, volume and mass - 30%	Prediction of area, volume and mass - 20%	Prediction of area, volume and mass - 10%
Choice of materials and their properties - 30%	Choice of materials and their properties - 20%	Choice of materials and their properties - 10%
level of appropriate model with respect to drawing and correlate its mass with respect to actual part.	Explanation relative motion its function - 30%	Explanation relative motion and function - 30%
Level of approximation with ignoring radius /fillet /chamfer /draft angle thread	To show the animation for changing various parameters in the model and the resultant displacement – 20%	Animation of math model in relation to product function- 30%
	To show in various projections – 10%	

## 2. Structural and Dynamic analysis

### Purpose of the event

- To understand the function of the given part and analysis the part for strength and stiffness for the given loads and service conditions.

### Eligibility Criteria - Participants

- Must have SAEINDIA membership
- Must have basic knowledge on Structure building
- Must have basic knowledge on Dynamic analysis
- Must have good software knowledge to interpret the results.

### Alignment with curriculum

- Engineering mechanics.
- Theory of machines.
- Finite element analysis.
- Engineering materials and their properties.

### Expected skills

Tier-1	Tier-2	Tier-3
<p>Understand the function of the part and assessing the loads acting on the parts and boundary conditions.</p> <p>Develop the governing equations.</p> <p>Understand the natural and essential boundary conditions.</p>	<p>Convert create a FEM model and carry out static analysis using (ANSYS is Preferable)</p> <p>Mesh convergence and the effect on the required results.</p>	<p>Carry out dynamic analysis and using a FEA solver (ANSYS is Preferable)</p> <p>Modal analysis.</p> <p>Validate the results from the solver with Matlab etc.</p>

### Kits and aids

- Colleges not having desired software can approach SAEINDIA for usage of the Software.

## Competition rule

- Structural (Static, Dynamic) problem given at the time of event from automotive domain.
- The assembly should have minimum 3parts and maximum of 5 parts.
- Software may be ANSYS or any other FEA solver (For pre-processing, solution and post processing).

## Team Size

- Team size: 3 students.
- Number of teams for Tier-1 as many as possible.
- One team from each college moves to Tier-2 (Divisional level).
- First two teams from each division moves to Tier- 3(Student Convention).

## Judging criteria

Tier-1	Tier-2	Tier-3
Quality of function analysis	Degrees of freedom	Degrees of freedom
Free body diagram	Estimating loads and load cases	Estimating loads and load cases
Estimating loads	Defining boundary conditions	Defining fixations
Defining fixations	Choice of load conditions	Choice of load conditions
	Choice of boundary conditions	Choice of boundary conditions
	Element type selection	Element selection
	Mesh sizing and conventional study	Mesh sizing
	Material allocation	Material allocation
	Interpretation/inference of static analysis results	Interpretation of static analysis results
		Interpretation of dynamic analysis results and critical frequency.

### 3. Computer Aided Manufacturing Competition

#### Purpose of the event

- The students pick up an automotive part and propose manufacturing sequence of operations and appropriate computer aided manufacturing programs as applicable.

#### Eligibility Criteria Participants

- Must have SAEINDIA membership.
- Must have basic knowledge on Manufacturing.
- Must have basic Computer Aided Manufacturing knowledge.

#### Alignment with curriculum

- Materials and manufacturing processes .
- Production technology.
- Computer Aided Manufacturing (CAM).

#### Expected skills

Tier-1	Tier-2	Tier-3
Identify manufacturing method and appropriate manufacturing stage to complete the machine.	Define various sequence and machining and appropriate machining steps and identify the scope of CAM	Application of CAM for the identified sequence of steps and optimize the CAM sequence and appropriate CAM Commands

#### Kits and aids expected

- Creo, CATIA, Solidworks is Preferable.

#### Competition rules

- Actual Work to be done offline.
- 10 Min Presentation at the competition.
- Models must be done using any other CAD software.



### Team Size

- Team size: 3 students.
- Number of teams for Tier-1 as many as possible.
- One team from each college moves to Tier-2 (Divisional level).
- Two teams from each division moves to Tier-3(Student Convention).

### Judging criteria and Marking Scheme

Tier-1	Tier-2	Tier-3
Quality of function analysis	Quality of function analysis	Material properties required
Material properties required	Material properties required	Finish and precision required and its value to be achieved.
Finish and precision required	Finish and precision required	Correctness of manufacturing process for the material, finish and precision
Correctness of material	Correctness of material	Process flow for the chosen process with respect to sequence of operations
Correctness of manufacturing process for the material, finish and precision	Correctness of manufacturing	CAM Program
	Process for the material , finish and precision.	Tool path optimization
	Process flow for the chosen process	Simulation of the process
	Appropriateness of CAM application	
	CAM program	

Score split-up shall be decided on the spot by Judges before the competition

## 4. Business Plan competition

### Introduction

India, the largest democratic republic in the world has a very high number of unemployed youngsters. Providing jobs to such a larger group is highly impossible unless the number of employers increases. Hence, the need of the hour is to increase the number of entrepreneurs who are potential employers.

### Purpose of the event

To create a scenario wherein young entrepreneurs develop a business plan to establish a new organization to generate job.

### Eligibility Criteria Participants

- Must have SAEINDIA membership.
- Must have clear idea on Business Planning.

### Expected skills

Tier-1
<p><b>Objective</b></p> <ul style="list-style-type: none"> <li>● To allow participants to study about a company and its operational model.</li> <li>● To understand the basic concepts of doing a business.</li> <li>● To induce the participants to generate new ideas.</li> </ul> <p><b>Choosing the Company</b></p> <p>The teams are asked to choose a company which was started and currently existing in India for more than 3 years.</p> <ul style="list-style-type: none"> <li>● The company should fall under any of the following sectors – Automobile Retail &amp; E-Commerce, Agro-based, IT, FMCG, Food, Travel, Pharma, Environment.</li> <li>● The company should be active and doing business.</li> </ul>

### Tier-2

The team selected for Tier-2 should draft a marketing plan with the idea that they have proposed at Tier- 1 level and should use the knowledge gained from Tier-1 to frame an effective plan in the following format

- SWOT Analysis
- Company offerings to the customer's needs and benefits.
- Target market
- Marketing strategies
- USP if any
- Competitive analysis
- Team member, their roles and responsibilities
- Road Map for 3 years and projected balance sheet.

Investment required initially and justification and cash flow required along with projected revenue along with dependencies.

### Tier-3

The format is similar to the Tier-2 presentation. But the contestants from Tier 2 who qualify for Tier-3 will be mentored by a team of young entrepreneurs.

### Presentation Format

- Presentation should mention the company name and its sector and the management team along with its product and services.
- Explain one key product/service in detail, and its customer's benefits.
- Mention its various marketing channels and its initial marketing strategies.
- Your USP to compete with competitors.
- If given a chance to start a company on their own, give details about the launch of the product and its relevance to the customer in any sector.

### Competition rules

#### Business plan reporting

- Written plan as per the standard format only (<2000 words)
- Presentation (<15 slides)

### Team Size

- Team size is 3, in order to make everyone contribute towards preparing & presenting a plan in an effective manner
- Any number of teams for Tier-1. The winner of Tier-1 shall be allowed to participate in Tier-2 and the winner & runners of Tier-2 from each division shall be allowed to participate in Tier 3 levels.

### Judging criteria and Marking Scheme

Tier-1	Marks	Tier-2 + Tier-3	Marks
Selection of company according to the rule company overview	5	Selection of company and sector (reason)	10
Quality of business plan(Product – technology service)	20	Product knowledge and uniqueness of the product for product appeal	20
Market potential, traction and milestones (business plan)	20	Customers need and potential	30
Competitive analysis and value proposition	10	Key marketing strategy	20
Feasibility / financial analysis and functioning requirement	20	Competitive analysis value proposition	20
Presentation	15		
Q/A	10		

## 5. Technical Paper Presentation Competition

### Purpose of the event

- The student selects a topic from the given list, collects information and presents the chosen subject in front of the judging panel

### Eligibility criteria

- Participants must have SAEINDIA membership
- Must have technical knowledge
- Must have good communication skills
- Capable of identifying the problem and optimization of solution

### Alignment with curriculum

- Converting a drawing/ illustration into part.
- Physical linkages.
- Materials and their properties.
- Kinematics behavior mechanism.

### Expected skills

Tier-1	Tier-2	Tier-3
<ul style="list-style-type: none"> <li>● Basic data collection</li> <li>● Logical reporting</li> </ul>	<ul style="list-style-type: none"> <li>● Good depth of data collection</li> <li>● Correlation of data collected from different sources and conclusion</li> </ul>	<ul style="list-style-type: none"> <li>● Quantitative validation of original idea either through theoretical investigation or experimental investigation</li> <li>● (Note: the participant must submit 2-d, 3-d modeling and analysis in software, depending upon the type of paper presented)</li> </ul>

### Kits and aids expected

- None

### Topics

- Alternate Propulsion Technologies
- Advanced Engine Technologies
- Fuel Injection Systems
- Hybrid and Electric vehicles
- Emerging Fuels and Fuel Cells
- Energy Storage Systems and Infrastructure
- Safety and Crash
- NVH and Cabin Comfort
- Automobile emissions and after treatments
- 3R-reduce, reuse and recycle
- Automotive electronics
- Vehicle Communications Network
- Nanotechnology
- Advanced lightweight materials
- Aero structure and technologies
- Off highway vehicles
- Vehicle body structures and frames
- Vehicle dynamics and handling
- Fuel economy and CO<sub>2</sub>
- Dynamic modeling processes
- Automotive testing and instrumentation
- Vehicle architecture
- Product development tools and techniques
- Policies, regulations and standards
- Public, private and academic partnerships

### Competition rules

Presentation in the competition

- 7-minute presentation
- 3-minute question and answer

### Team size

- Team size: 3 students
- Number of teams for Tier-1: as many as possible
- The winner of Tier-1 shall be allowed to participate in Tier-2 and the winner and runners of tier -2 from each division shall be allowed to participate in tier -3 levels.

### Judging criteria and Marking scheme

Tier-1	Tier-2	Tier-3
Quality of paper -70% Criteria : At par to SAE international		Quality and content as per SAE international of paper -40%
		For design and analysis -30% Criteria: Based on drawing views, objective and conformity of 2-D, 3-D and Analysis design.
		Presentation / Quality of technical content - 30% Criteria: Quality of slides, Question & answer, Data collection

## 6. Auto Quiz competition

### The concept

Checking the general knowledge of the participants related to the automotive and related subjects mentioned below.

- History
- Places
- Personalities
- Technologies
- Companies
- Vehicle types and specifications
- Statistics of vehicles and so on
- All Automotive related subjects (as part of curriculum)

### Eligibility Criteria Participants

- Must have SAEINDIA membership
- Must have knowledge on automotive related subjects

### Expected skills

Tier-1	Tier-2	Tier-3
Generic answers with aids using clue and so on.	Generic answers without aids.	Specific answers with or without aids
Less questions	Medium level of questions.	More questions and multiple rounds

### Kits and aids expected

Not applicable.

### Competition rules

#### Stages of the event

- Quiz may be conducted on the following rounds
- General/Audio Visual/Specialization/Rapid Fire/Jackpot round.



### **Time per team for answers**

- For rounds other than rapid fire
- 30 seconds on direct
  
- 15 seconds on pass
- For rapid fire round
- 120 seconds for 10 questions

### **Team Size**

- Team size: 3 students
- Maximum Number of teams for Tier-1
- One team from each college moves to Tier-2 (division level)
- Two teams from each division moves to Tier-3 (convention)

### **Difficulty and number questions**

- As per the expectations at different Tiers mentioned above

### **Marking Scheme**

- First time right 5 marks
- Bonus 1 mark
- Rapid fire 2 marks for right answer
- Negative mark -1 for wrong answer as per the following rules
- Tier-1 No negative marks

## 11. Welding

### Purpose of the event

Understanding the given concept and weld 2 components.

### Expected Skills

Each team should weld a Lap, Butt, and Corner T joint with the given rectangular plate. (Mild Steel)

### Kits and Aids

- Materials Supplied in Toolbox
- Non-consumable materials, equipment and tools to be supplied by the Competitor.
- All standard equipment as needed may be provided by the organizers.
- Any specific that is needed shall be indicated while registration.
- Competitors may use their own TIG, MIG, ARC WELDING & GAS WELDING pieces/torches;

### Expected Rules

- Contestants must be enrolled as a SAE member in his college
- One team from each college moves to Tier II (Division Level)
- Two teams from each division moves to Tier III (Convention)

Tier-1	Tier-2	Tier-3
Each team should weld a Lap, Butt, Corner & T joint with the given rectangular plate. (Mild Steel)	Each Team should weld a model using the supplied kit. Weld can be of any type (Lap, Butt, and Corner & T joint). Models can be rectangular plates or roll bars (Mild Steel)	Each team should weld a model using Roll cage pipes (Mild Steel), as in Baja or Supra.

### Team Size

Maximum 3 members per team

## Judging Criteria

S.No	Criterion	Marks
1	Dimension of weld	20
2	Quality of weld	20
3	Inspection	30
4	Testing	30
<b>Total marks</b>		<b>100</b>

Note: The participants can bring their own safety equipment like goggles, shield etc... For the event.

## 12. Mobile Robotics – Just Do It

### Purpose of the event

- Engineers have to come up with optimized solution to given constraints and parameters.
- Given sequence of factory shop floor where components with technical defects are placed among the normal component. Mobile robot has to sense and pick the component and place it in the rejected lot.
- Analyze the situation and build a robot with required constraints and parameters to accomplish the given task.

### Eligibility Criteria Participant

- Must have SAEINDIA membership
- Must have basic knowledge on robotics
- Must have basic knowledge on programming

### Expected skills

- Basic microcontroller programming
- Selection procedure of drives and sensors
- Problem analysis and quick resolution capability

● Tier-1	Tier-2	Tier-3
Make simple robots using Arduino	Present your robot doing a specific function	Test your Robot which perform multi tasks in a production line

### Competition Rules

- The team has to test the robot in the given layout.
- The final bot will be judged comparing with respect to the initial design document
- Endurance and durability of the robot will be taken into concern.

### Team Size

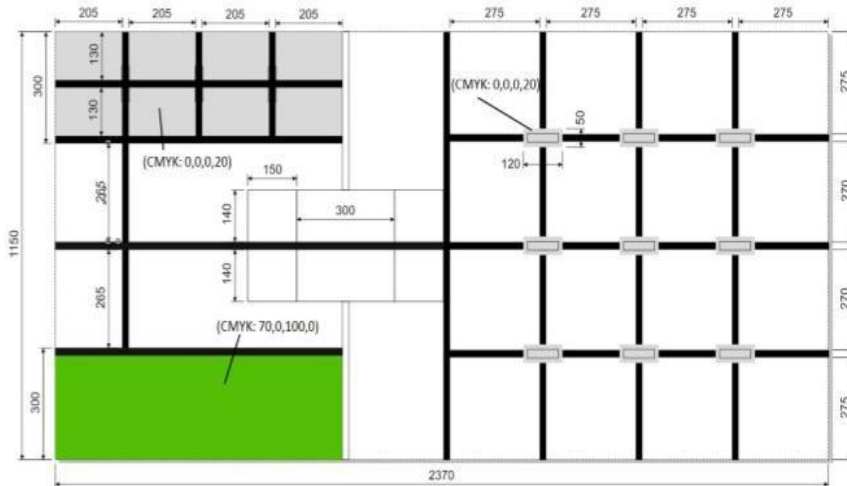
- Team size: 3 (For Mechanical) and Task to be done is Formulation and Logic.
- Team size: 3 (For EEE/ECE/EI/CS/IT) and Task to be done is Programming.

## Judging criteria and Marking Scheme

S. No	Criteria	Marks
1	Documentation	10
2	Robot Specification	10
3	Construction	10
4	Rules Compilation	10
5	Time	15
6	Task optimization	15
7	Effectiveness of the robot work	Max of 100
8	Logic	20
9	Simplicity of bot	20

- Score will be calculated at the end of the challenge or when time stops.
- Detection of good components without disturbing ' would help to gain 10 points.
- Detection of bad components would gain 20 points.
- Picking up the component would gain 25 points without disturbing.
- Each disturbance would cost a penalty of 25 points.
- Successful completion of the mission would lead to gaining of 100 points.

## Drive and Sensor Selection



## Factory Layout



## Details of the Mat

- Horizontal Dimensions: 2370 mm × 1150 mm.
- A wall that is 16 mm in width surrounds the table. The height of the wall is 50 mm.
- The height of the barrier between the Storage Station area and the field area is 50mm
- The table base color is white, except for the black line, Challenge Object

Areas, Warehouse, and the Base area.

- There are 9 rectangles in the Outer Space area that are 120 mm x 50 mm.
- Three intersections of the black lines in the Warehouse are the places where the good components are set at the beginning of every attempt.

## 16. Sheet Metal

### Purpose of the event

The competition has been designed to reflect the skills of students ,who are interested in the field of sheet metal stamping. It is open to all streams of Engineering.

### Objective:

A problem statement (Relating to Automotive Technology) would be put out by the organizing committee. The student team is expected to come with a possible solution which can be prototyped with the help of sheet metal.

### Expected Skills

● Tier-1	Tier-2	Tier-3
Fabrication of given 2D model into a prototype model.	Selected students will have to convert their 2D model into a prototype model. Fabrication can be done using manual rolling, folding, bending and shaping equipment which will be provided. Check using gauges, Vernier calipers, rules, squares; which will be provided.	Construct assemblies by appropriate techniques. Riveting operation & Adhesives can be used to join the sheet metals to form the assembly. Proper polishing, finishing and painting should be ensured.

### Kits and aids expected

SAEISS will provide the raw materials. Any other thing that may be needed may be brought by the team members.

### Team Size

- Maximum of 3 members

### Competition rules

Teams will have to submit sheet metal design part drawings.

Shortlisted teams will have to do sheet metal process plan, as part of the fabrication and assembly stage.



## Judging Criteria

S No		Marks
1	Pattern Drawing	30
2	Fabrication	20
3	Assembly and Fit up	40
4	Appearance, Finish & Explanation	10

## 20.Group Discussion Competition

### The concept

The students will be divided into groups on the spot and will be given a situation to solve by discussing it with their fellow teammates.

### Topic

On the spot topics of general social importance / situation / event / theme will be given.

### Expected skills

Tier-1	Tier-2	Tier-3
Knowledge on current affairs and events.		
Time management and team role playing.		
Good Communication and paraphrasing / summarizing skills.		
Listening, public speaking and social engagement skills.		

### Competition rules

- Each group will be given 10 minutes
- Decision of the judges will be final in all regards.

### Team size

Best 3 participants in college level will be selected to Tier II

Best 3 participants in Tier II (irrespective of college) will be selected to Tier III

Best 3 participants in Tier III (irrespective of college) will be selected as winners

### Judging criteria

Evaluation may be for group / individual

- Knowledge of the topic given
- Communication and presentation skills
- Problem solving
- Reasoning and observation skills

- Leadership quality
- Body language
- Group behaviour

## 25. Material Identification

### Concept

Identify the material of the given product or components in automobiles. This competition reflects a range of materials skills used across quality department in various automotive industries.

### Alignment with curriculum

- Identify the material of components.
- Description of material and their properties.
- Describe the use of that material.

• Tier-1	Tier-2	Tier-3
Participants are questioned and analyzed based on their knowledge regarding the basics of material properties usage and their composition.	Each team should identify the material of components which will be providing on clearing the prelims and write the description of material. The team must present their conclusion in front of the jury.	Choose proper materials to perform a specific function in a machine component. Identify the different material is a big assembly of parts Example: Train bogie, Machine tools, Optimize the material usage and proper choice using any software.

### Kits and aids

- Component will be provided for teams clearing the prelims.

### Teams size: 3 members

- Teams clearing the prelims are promoted to final round.
- The teams should be able to find out material of given component within the given time.
- Based on the presentation, identification and time taken teams are to be evaluated.

## 30. Internet of Things

### Introduction

Automotive Manufacturers are leveraging their interest in IoT related to automotive. There is a growing trend and huge business opportunity in connected cars. Currently, automakers are connecting their vehicles in two ways: embedded and tethered. Embedded cars use a built-in antenna and chipset, while tethered connections use hardware to allow drivers to connect to their cars via their smartphones.

### Objective

The purpose of the event is to propose innovative ideas and develop prototype for an IoT based system that can make a smart connected car. The student selects a topic, collects information and presents a synopsis or abstract.

### Expected skills

Tier -1	Tier -2	Tier -3
Proposal submission and detailed presentation.	Good Knowledge on the various functionalities of the system and present a functional prototype	Participant must give a detailed presentation along with the final demo of the system with a working prototype.

### Competition rules

Paper should be submitted one week ahead of the competition date. Presentation can be for 7-minute presentation and 3-minute question and answer. The team must develop an application based on the proposal submitted .Application can be developed on any platform compatible for either Android or IOS and the final Apk file must be submitted.

**Team Size** Maximum 3 members per team.

### Judging Criteria

Tier -1	Tier -2	Tier -3
<p>70% for quality for paper Criteria: according to the SAE International and Novelty of the Proposal 30% for presentation Criteria: quality of slides, clarity of presentation and confidence in answering queries Data collection.</p>	<p>Evaluation of the prototype based on stated proposal &amp; feature functionality</p>	<p>80% for the completion and successful demo of the functionality in match with the proposal. 20% for the Presentation and scope for future enhancement</p>

## 31. 3D Printing

### Introduction

- 3D printing is an additive Manufacturing technology where digital 3D design data is used to build up a component in layers by depositing material. It uses a technology known as FDM (Fused Deposition Modelling) or FFF (Fused Filament Fabrication). There are other methods like laser sintering, DLP, etc. This is considered a future manufacturing technology and hence awareness in this technology.

### Objective

- Any component to be 3D printed is scanned and morphed in the computer with 3D CAD modelling and then printed by a 3D printer.

### Expected Skills

- Planning and 3D Slicing creation of a CAD model, generating the G-codes, 3D printing the same in an FDM based 3D printer post processing the 3D printed part such as removing the supports.

Tier -1	Tier -2	Tier -3
<p>ting on traditional manufacturing process. printing technology.</p>	<p>odel of the part provided which has to be modeled by the participants in any CAD software and exported to .stl file, and sliced using "Cura" (slicing software). done in an efficient way with minimal supports, minimal printing time, and maximum print quality and the .g code should be created for the 3D printer</p>	<p>.g code file without flaws. Post process the printed part like removing the supports and finishing the part.</p>

### Kits / aids

- Laptops with the required CAD software shall be brought by participants.
- 3D printers and filaments will be provided at the event

- Slicing software Cura installation file will also be provided at the event.
- All other kits and aids will be provided.
- Participants should submit a report on the model they developed and they will go through a viva with the judge.

**Team Size** 3 Students

**Judging Criteria / Scoring Marks**

S.No	Criterion	Marks
1	3D Printing time	25
2	Minimal Support	25
3	Stability of the product	10
4	General look & finish of the product	10
5	Report content	10
6	Question & Answer	20
<b>Total marks</b>		<b>100</b>



## 32. Bridge Building

### Purpose of the event

- To fabricate a bridge based on basic concepts of a bridge.

### Expected Skills

- Fabrication techniques.
- Knowledge about the construction materials, physical and structural properties
- Concepts of strength of materials, testing and failure mechanism.

### Competition rules

Tier -1	Tier-2	Tier-3
A set of 25 questions will be given to every team and 30 minutes is allotted for solving it. Best of 10 teams will move to the next round.	Construction of a bridge By using soft tool (West Point Bridge Design)	Construction of a bridge Prototype model using given materials. Testing to check its viability

### Kits and Aids

All the necessary materials to create a model of a bridge will be provided.

**Team Size** 2-3 students

### Judging Criteria

S.No	Criterion	Marks
1	Construction Technique and quality	15
2	Creativity & Aesthetics	15
3	Engineering analysis	30
4	Strength to weight ratio	40
<b>Total marks</b>		<b>100</b>

## 35. Mobile App Development

### Introduction

Uses of mobile enterprise solutions in the automotive industry are numerous. The capability of smart phones and the cost effectiveness of the mobile apps available in the automotive sector have made the automobile industry look for better options that would provide users with hands free experience while driving.

### Purpose of the Event

The purpose of the event is to propose and create innovative mobile app for automotive sector according to the latest automotive market standards, that are also customizable mobile apps. Apart from the design, security and distribution are to be addressed during the development of the apps.

### Expected skills

Tier-1	Tier-2	Tier-3
Proposal submission and presentation.	Good Knowledge on the various functionalities in the App and execute a few of them.	Participant must give a detailed presentation along with the final demo of the app along with documentation.

### Competition rules

Paper should be submitted one week ahead of the competition date.

Presentation in 10 mins including Q & A.

Apps should be based on the proposal submitted.

Application can be developed on any platform compatible to Android or IOS

Final Apk file must be submitted.

Number teams for Tier-1: as much as possible

One team from each college moves to Tier-2 (division level).

Two teams from each division moves to Tier-3 (convention).

**Team size:** maximum of 3 members

### Judging criteria & Marking scheme

Tier-1	Tier-2	Tier-3
<p>70% for quality for paper Criteria: according to the SAE International and Novelty of the Proposal</p> <p>30% for presentation Criteria: quality of slides, clarity of presentation and confidence in answering queries Data collection.</p>	<p>30% for UI design, 40% for basic functionality test and 30% for presentation.</p>	<p>80% for the completion and successful demo of the functionality in match with the proposal. 20% for the Presentation and scope for future enhancement.</p> <p>Any additional criteria may be decided by the judge before the start of the event.</p>

## 40. Biomimicry

### Purpose of the event

- Students can pick up any natural organism and modify an existing technology or introduce a new technology by taking any property of the selected organism.

### Eligibility criteria

- Participants must have SAEINDIA membership
- Must have ability to prepare a mini prototype models
- Capable of identifying the problem and alternatives to that of the organism

### Expected skills

- Identify the peculiarity of the organism and explain how it can reduce human effort or how it can modify an existing technology
- To prepare a mini prototype of the newly designed or modified structure

### Kits and aids expected

- None

### Team Size

- Team size: 3 students

### Judging criteria and Marking schemes

Tier-1	Tier-2	Tier-3
Identifying the feature or a characteristic of the organism	Develop a new Technology or concept using mimicking of given Organism.	Mini prototype of the newly designed and modified structure. Presentation.

## 43. Engineering Drawing

### Objective

- Graphical representation makes it easy to understand and interpret data at a glance. Drawing is the oldest and efficient way to put data in simpler terms. Engineering is all about planning and implementing and no planning is perfect without a schematic representation.

### Required Skills

- Engineering graphics Knowledge.

### Team Size

- Maximum 3 members per team.

Tier-1	Tier-2	Tier-3
20 Prelims questions.	Given diagram or part shall be detailed in the given format. Standards used in drawing.	Component given and participants detailed in the drawing. Draw any projections and sections given in the problem.

### Competition Rules

- Proper folding of sheets.
- Use of pencils for required purpose.
- Use chain dimensioning and mark the dimensions outside of the view.
- Use Title block, scale.
- Layout with all views.
- Material data.
- Machine detailing if applicable.
- Any specific instructions.

### Judging Criteria

- 2H pencil for dimensioning.
- Proper arrow size.
- Chain dimensioning and marking the dimensioning outside of the diagram.
- A3 sheet folding (125/105/190).

## 46. Geometric Dimensions & Tolerance

### Purpose of the Event

Participants are expected to answer questions based on Geometric Dimensions and Tolerance

### Expected skills

Tier1	Tier2	Tier 3
The participant has to know G D&T symbols extensively	The participant has to be able to solve problems based on G D&T	Standards used in G D&T Symbols for given process and product. Draw detailed working drawing for a product.

### Kits and aid expected

None

### Competition rules

- Only one answer per question is allowed
- Each question carries 1 mark
- For Round Two, the entry will only be entertained if the symbols are legible.
- No negative marking
- Use of guides in any form (electronic or paper) is prohibited.

### Team size

- 3 students per team
- No limitations for number of teams in round one  
The winner will be chosen according to the number of right questions answered

## 50. Python Programming

### Purpose of the event

- Drafting the basic flow chart and logic for the given program and solving the problem by executing the code using python.

### Alignment with curriculum

- Logical thinking
- Application of problem solving methodologies
- Coding knowledge

### Expected Skills

- Must have knowledge in algorithms, drafting flowcharts, debugging and programming using python.

Tier1	Tier2	Tier 3
Debug the given program and use it to solve the problem.	Algorithm, flowchart and program for solving the given problem.	Use python for solving engineering problems.

### Kits and Aids

- Python 3.6 module (32-BIT)
- Idle (Python 32- BIT)

### Competition rules

- Contestants are expected to bring laptops with stipulated version of the software.
- Complete the flowchart and algorithm within the given time.
- Execute the given program without any error before the stipulated time.

**Team Size** : 3 students.

### Judging Criteria

- Correctness of the logic
- Efficiency and versatility of the program
- Originality of the code
- Performance in Viva round

## 54. Entrepreneurship (Business Sprint Challenge)

### Background

Over 85 percent of new businesses fail within a few years, often because they try to plan their way to success. What's worse, research suggests that writing a business plan has no correlation with success. It's time to change. Business Model Competition represents a radical departure from the past and the crest of a new paradigm in entrepreneurship.

### Concept

The Business Spring Challenge is not a business plan competition. Participants won't be rewarded for doing lots of library research, drawing fancy graphs, or crafting the perfect sales pitch to venture capitalists.

Teams are evaluated based on

- 1) Breaking down their idea into the key business model hypotheses
- 2) Getting outside the building and testing their assumptions with customers
- 3) Applying Customer Development / Lean Startup principles to make sure they nail the solution, and
- 4) Learning to pivot (or change) until they have a customer-validated business model

### Event BluePrint



**Tier 1**

Participants team shall bring an 8 minute video of their Business model and present to the Judge.

Hypothesis:

- Did the team use a canvas to identify and track hypotheses?
- Did the team clearly state their hypotheses?
- Did the team identify the most crucial hypotheses to test first (the ones that could kill their business)?

**Tier 2**

Test

Did the team design low cost, rapid, but reliable tests of these hypotheses?

Did the team conduct the tests in a reliable manner?

Number of tests - should be adjusted for industry, product type (web vs physical product), and business type (B2B vs B2C)

Quality of tests - interviews are high quality, surveys & focus groups are much lower quality (you don't know which questions to ask) unless interviews have been conducted first

If appropriate, has the team developed a prototype or minimum viable product (MVP)?

Does the team understand the hypotheses they are testing with a prototype or MVP? Is the proto•type or MVP appropriate to answer those hypotheses?

**Tier 3**

Did the team clearly state their insights and learning, how those validated or invalidated a hypothesis, and if that informed any pivots (changes)?

If changes were made, was the pivot the team made supported by evidence or did they fail to pivot when the evidence clearly stated it?

Does the team have significant evidence that the solution is validated (i.e., letters of intent, purchase contracts, sales, partners, etc.)?

Is the team solving a significant problem (defined in terms of money or impact)?

**Note:** Because web-based businesses are easier to test, these companies can often pivot faster. Judges are asked to not penalize physical product companies or health-related businesses because they have not pivoted as much or made as many iterations as web-based businesses.

### Materials Required

All the team members shall bring their own laptop with Microsoft office installed prior to the event.

### Competition Rules

- A maximum of 3 students are allowed per team.
- Teams have to complete all the rounds.
- The teams should be able to within the given time as specified in the questions. No extra time will be provided.
- Based on the presentation and solutions provided by team to be evaluated and time is important.
- Judging will be done based on the accuracy, correct answer and best solutions provided within the given time frame.
- Judges Decision will be the final.