

SAEINDIA
SOUTHERN SECTION

STUDENT CONVENTION 2021-22

RULE BOOK



SAEISS STUDENT CONVENTION RULE BOOK 2021-22

NO	Event Name	NO	Event
	Phase 1		Phase 2
1	Structural and Dynamic analysis	16	Internet of Things
2	Computer Aided Manufacturing	17	3D Printing
3	Business Plan competition	18	Big Data
4	Technical paper presentation	19	Mobile App Development
5	Auto Quiz	20	Circuit Design
6	CFD Analysis	21	Biomimicry
7	Prototype Modelling	22	Digital Manufacturing
8	Mechatronics	23	Design of Parts and Assembly
9	Mechanical Computer aided Design	24	Engineering Drawing
10	Electronics	25	Six Sigma
11	Group Discussion Competition	26	Engineering Problem Solving
12	Vehicle Weight Management	27	GEOMETRIC DIMENSIONS & TOLERANCE
13	Diagrammatic Reasoning	28	Cloud Computing
14	Manufacturing Process Planning	29	Plant layout in manufacturing engineering
15	Reverse engineering	30	Embedded system Design

1. 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

Understand the function of the part and assessing the loads acting on the parts and boundary conditions. Create a FEM Model in any if the analysis software , carry out static analysis

Kits and aids

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

Competition rules

- Any structural (Static, Dynamic) problem can be taken by the students 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: 2 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
Quality of function analysis
Free body diagram
Estimating loads
Defining fixations
Defining boundary conditions, Element type selection, Inference of static analysis results

2. 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-

Identify manufacturing method and appropriate manufacturing stages to complete the machine. Identify the scope of CAM

Kits and aids expected

- Creo, CATIA, Solid work is Preferable.

Competition rules

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

Team Size

- Team size: 2 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
Quality of function analysis
Material properties required
Finish and precision required
Correctness of material
Correctness of manufacturing process for the material, finish and precision

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

3. Business Plan competition

Introduction

India, the largest democratic in the world and is also going to be the youngest country in the ageing world. Providing jobs to such a larger group is highly impossible until the number of employers gets increased. So there is a need to create more employers or in other way more number of entrepreneurs.

Purpose of the event

To create a scenario where 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-Case Study of a real Business model Objective

- To allow participants to study about a company and its operational model
- To understand the basic concepts of doing a business
- To induce the participants to generate new ideas.

Choosing the Company

The teams are asked to choose a company which was started and currently existing in India for more than 3 years.

- The company should fall under any of the following sectors – Automobile Retail & E-Commerce, Agro-based, IT, FMCG, Food, Travel, Pharma, Environment.
- The company should be active and doing business

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 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 & Runners 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
Selection of company according to the rule company overview	5
Quality of business plan(Product – technology service)	2 0
Market potential, traction and milestones (business plan)	2 0
Competitive analysis and value proposition	1 0
Feasibility / financial analysis and functioning requirement	2 0
Presentation	1 5
Q/A	1 0

4. Technical Paper Presentation Competition

Purpose of the event

- The student selects a topic from the given list, collects information and presents a synopsis or abstract

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

- Basic data collection
- Logical reporting
- Correlation of data collected from different sources and conclusion

Kits and aids expected

- None

Topics

- Alternate Propulsion Technologies
- Advanced Engine Technologies
- Fuel Injection Systems
- Advanced lightweight materials
- Aero structure and technologies
- Off highway vehicles

- 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
- Nano technology
- Vehicle body structures and frames
- Vehicle dynamics and handling
- Fuel economy and Co2
- 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: 2 students
- Number of teams for Tier-1: as many as possible
- One team from each college moves to Tier-2 (division level)
- Two teams from each division moves to Tier-3 (convention)

Judging criteria and Marking scheme

Tier-1	
	Quality of paper -70% Criteria : According to SAE international
	Presentation /Quality of technical content -30% Criteria: Quality of slides, Question & answer, Data collection

5. 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
Generic answers with aids using clue and so on.
Less questions

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

6. CFD Analysis Contest

Purpose of the event

- Build a CFD model
- Analyze the model for flow and thermal distribution
- CFD to demonstrate thermal conductivity of a part.

Eligibility Criteria Participant

- Must have SAEINDIA membership
- Must have basic knowledge on Fluid Dynamics
- Must have basic software knowledge

Alignment with curriculum

- Thermodynamic
- Thermal engineering
- Heat and mass transfer
- Validating design procedure.

Expected skills

Tier-1

Choosing of governing equations and boundary conditions.
Discretize the model with appropriate CFD models techniques using CFD Tool
and then perform steady state analysis.

Competition rules

- Students can take any model for steady static and optimization.
- Students have to use CFD software to demonstrate.
- Validation of results with appropriate methods (analytically or matlab)

Kits and aids

- Colleges not having desired software can approach SAEINDIA for help in the same.

Team Size

- Team Size : 3 Students per team
- Number of Teams for Tier-1 : as many as possible
- One team from each college will participate in Tier-2 (Division Level)
- Top 2 teams from each division will participate in Tier-3 (Convention Level)

Judging criteria

Tier-1
Model Preparation, choosing of governing equations and boundary conditions applied
Type of meshing
Mesh Quality
Choice of loads and boundary condition
Material & property selection
Analysis
Result interpretation and validation

7. Prototype Modeling

Purpose of the event

Prototype Modeling engineers are developers or producers of 3D new product models. New product is designed and developed based on a concept and next step is to make a mockup to have a look and feel of the eventual product.

Eligibility Criteria

2D Sketching, Clay Molding, Creativity

Kits and aids expected

- Students should not wear loose dresses to ensure their safety in the machine shop.
- They should bring the necessary stationary items as required.
- The required material for this round (Ex: Clay, Colors, Stickers) will be provided by the organizing committee.

Competition rules

- Analyze the problem statement, the team must design the model through 2D sketches and dimension.
- Team has to make the prototype model of their design by using the clay and decorate it with given materials.
- The final prototype will be judged comparing the initial design.

Team Size: Maximum 3 students.

Judging Criteria

- Marks for each team will be awarded by an expert, based on the accuracy and time taken to complete the event which may be stated before the start of the event.

8. Mechatronics

Technical Description

Mechatronics is a branch of engineering that integrates mechanics, electronics, control systems and computer science engineering. Mechatronic system design deals with the integrated and optimal design of a physical system, including sensors, actuators, and electronic components, and its embedded digital control system.

Purpose of the event

Students are expected to design and execute a real time mechatronic system or a production line replica that can be used to partially automate the respective process. The task is complete when the system/production line has been mechanically assembled, correctly wired, connected and its correct operation is guaranteed and executed.

Eligibility Criteria Participant

- Must have SAEINDIA membership
- Must have basic knowledge on mechanics, electronics, control systems and computer science engineering

Expected skills

- Individual needs to know and understand principles and applications for; Designing, assembling and commissioning a mechatronic system.
- The components and functions of hydraulics, electrical and electronic systems, drives, industrial robotics and PLC systems (as used).
- The individual should be able to design pneumatic, electrical and hydraulic circuits.
- The individual needs to know and understand the criteria and methods for testing equipment and systems.

Kits and aids expected

The necessary components for the design of the real time mechatronics system are expected to be brought by the individual.

Competition rules

- Actual working model has to be done off line.
- 10 Min PPT presentation at the competition.

Team Size

- Team size: 3

Judging criteria

S. No	Criteria	Marks
1	Rating of the system/production line depending on industry standards	25
2	Judicious usage of components	15
3	Optimizing of the system/production line.	25
4	Technical language associated with the skill	20
5	Quality of report and presentation	15

9. Mechanical Computer aided Design (MCAD)

Introduction

Mechanical Engineering Design covers the use of Computer Aided Design (CAD) technology in the preparation of graphical models, drawings, paperwork and files containing all the information necessary for manufacture and documentation of parts and components typical of solutions to mechanical engineering problems facing workers in industry. It's an opportunity for young student designers to learn industry design skills who are willing to pursue their career in the field of design.

Purpose of the event

- The scope of work includes to Design, create 3D model and create 2D drawings including material specs, manufacturing process, GD & T etc.

Expected Skills

- Knowledge and understanding of 3D modeling of part.
- Knowledge of any CAD software.
- Knowledge / awareness in creating 2D manufacturing drawings.

Kits and aids expected

- All Competitors must review the given question from industry experts' access and understand it and model the part. Understanding of GD&T is needed.

Team Size :

Maximum of 3 members

Competition rules

Round -1	Round -2
<p>If required, create sketches on paper. Information to assist with measurement process.</p> <p>Measuring accuracy = ± 0.2 mm across machined surfaces.</p> <p>Measuring accuracy = ± 0.5 mm across unfinished surfaces.</p> <p>Radii and chamfers > 0.4 mm not required. Neglect any surface irregularities.</p> <p>1.5-degree draft angle where required. Review the provided sketches for dimensions.</p> <p>Create the model of the part and save the part.</p> <p>Appropriate model gets promoted to round 2</p>	<p>Create required views to display the major features of the part.</p> <p>Create a detailed drawing of the part. All annotation styles must meet ISO standards.</p> <p>Dimension as required for manufacturing. All main parts are to be included in the drawings</p> <p>Dimensions should be placed using one decimal place.</p> <p>Apply GDT</p> <p>Add a note listing the volume of the part in mm³. Provide a rendered image as appropriate</p>

10. Electronics

Introduction

Traditionally automobiles had majority of mechanical parts assembly, but now-a-days thirty to forty percent of vehicle assembly consists of Electronic parts. This event stresses the importance of electronics to the students of mechanical and automobile field and in the other way attract the students of electrical and electronics to the automotive sectors.

Eligibility Criteria

Participants

- Must have SAEINDIA membership
- Must have basic knowledge on programming and circuit design.

Event details

Round 1 (Circuit Design):

- Explaining the functioning of components used in their own circuit.
- Finding faults in the given basic circuit.
- It is an Elimination round.

Round 2 (Programming Module):

- Writing an algorithm to the electronic circuit.
- Writing the program to the electronic circuit.
- It is an elimination round.

Round 3 (Assembling):

- Assembling the components.
- Demonstrating the working unit.

Kits and aids expected

Students should bring the required components for their own electronic circuits. Only circuits for fault finding will be provided.

Competition rules

Programming could be done using MATLAB/SCADA. Evaluation by the judges will be final in all regards

Team Size

Maximum 4 per team.

Judging criteria and Marking Scheme

Criteria	Marks
Finding faulty spots and evidence	15
Repairing	15
Software functionality	25
Check for operating condition	20
Assembly according to quality	25

Note: Economically feasible electronic circuits will be encouraged. So it could be taken to the next stage of production.

11.Group Discussion Competition

The concept

The students will be divided into groups on 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

- 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 behavior

12. Vehicle Weight Management Design

Purpose of the event

- Proposal on good working ideas of proposed vehicle and formulating presentation regarding the same.

Kits and aids expected

- Things needed for a presentation.

Competition rules

- 15 mins will be provided to present their design.
- 10 mins for question and answer.

Team Size :

- Maximum of 3 per Team

Judging Criteria

Presentation on Judges shall be evaluated Criteria.

1. Design justification
2. Technical merit
3. Value proposition cost, usage, implication on society.
4. Presentation delivery and effectiveness

13. Diagrammatic Reasoning

The concept

Students should understand the terms in the diagram relating to engineering and to choose the answer appropriately. The students are advised to see the following links to know how to approach diagrammatic reasoning and questions based on Venn diagrams

<http://www.savilleconsulting.co.za/wp-content/uploads/2012/08/preparation-guide-diagrammatic-reasoning.pdf> <http://www.indiabix.com/verbal-reasoning/venn-diagrams/>

Purpose of the event

To get an exposure for attending aptitudes in the interviews and understanding the engineering processes in simple way.

Eligibility Criteria

The individual,

- Must have SAEINDIA membership
- Must have knowledge Engineering drawing.

Kits and aids expected

Not applicable.

Competition rules

- All the questions will be related to engineering field
- The event will take place in 3 levels and number of teams will be filtered depending upon total number of registrations we get.
- The level of difficulty will increase in each level
- Number of questions, question type and time limit will be announced during the event.
- The students must be prepared in all curriculum subjects, their applications and should possess with logical thinking

Team Size

Maximum of 3 students

14. Manufacturing Process Planning

The concept

To make a detailed plan to complete a manufacturing operation in the least amount of time at lowest cost.

Introduction

Manufacturing Process Planning is a necessary skill where the focus is to complete a job at the lowest cost. It involves Manufacturing planning, process planning, material processing, process engineering, and machine routing and preparation of work instructions sheet.

Expected skills

- Basic manufacturing technologies and operations knowledge.
- Knowledge of computer aided process planning software.

Kits and aids expected

- Participants would be provided with Part Planner software or NX Process planning software.

Competition rules

Qualification phase–

1. MCQ related to manufacturing technology and operations.
2. Process Planning phase – To determine the fastest and most economical way to produce the part. In case of more number of participants clearing the process planning round, a third round of VIVA would be used for tie –breaker purposes with Question and answer session.

Team Size:

3 per team.

Judging Criteria and Marking Scheme

Minimum no of process activity,
Use of appropriate methods and least time.
Weightage shall be decided by the judges.

15. Reverse engineering

Purpose of the Event

To make a duplicate model of an object using reverse engineering process.

Eligibility Criteria

Must have basic knowledge to understand the 2D drawing and 3D modeling

Expected skills

Round 1

Each team should write about the given part i.e. The materials used manufacturing process/method.

Kits and aid expected

Non-Consumable materials, equipment and tools should be supplied by the organizer. Consumables may be provided on prior information. Some that are available are

Newspapers and Thermo coal, Adhesives such as tapes, glue sticks, pins etc. Cutting tools such as scissors, blades.

Competition rules

- The team is independent of selecting the object.
- The team can use any software for preparing the 3D model.

Team size: maximum 2- team.

Judging criteria & Marking scheme

Content	Marks Allotted
Write up	15
Accuracy of 3D model	15
Time taken for 3d model.	10
Complexity of the object selected.	10
2D Drawing of the give object	20
Duplicate object	30
TOTAL	100

16. 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 smart phones.

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 competition date. Presentation can be for 7-minute presentation and 3-minute question and answer. The team must develop the 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 2 members per team.

Judging Criteria

Tier 1

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.

17. 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 the 3D printer.

Expected Skills

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

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.

Competition rules

- Workshop attendance is compulsory on the previous day of the event for short listing on the challenge round.
- Creation of 3D model 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).

- Slicing should be 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.
- 3D printing of the the .g code file without flaws.
- Post process the printed part like removing the supports and finishing the part.

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
Total marks		100

Team Size
3 Students

Judging Criteria / Scoring Marks

18. Big Data

About

Automakers are ramping up their connected car efforts for several reasons. Internet connectivity in vehicles allows car companies to release software updates in real time. Automotive companies can use data from the car to analyze its performance and obtain valuable data on how drivers use their cars. Real-world vehicle performance will both influence and benefit from Big Data. Information gathered from the field from vehicle systems, driver inputs and external conditions will exert a major influence over the design of components and the characteristics of future vehicles.

Purpose of the event:

The purpose of the event is to propose and create innovative system that can gather data throughout the life cycle of the vehicle so that auto manufacturers can use the data to shape future vehicle designs. Every part of the vehicle can be tweaked and tuned. Real- world data collected from billions of miles driven will undoubtedly influence safety, aerodynamics, performance, power algorithms and other fundamental elements of the vehicle.

Expectations:

Tier-
Proposal submission and presentation.

Competition rules:

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

Presentation in competition:

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

The team must develop the application based on the proposal submitted.

Teams:

Team size: 2-3 students

- Number teams for Tier-1: as much as possible
- One team from each college moves to Tier-2 (division level).
- TwoteamsfromeachdivisionmovestoTier-3(convention).

Judging criteria:

Tier-1
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.

19. 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 the mobile apps. Apart from the design, security and distribution are to be addressed during the development of the apps.

Expected skills

Tier-1

Proposal submission and detailed presentation.

Competition rules

Paper should be submitted one week ahead of competition date.

Presentation in 10 mines including Q & A.

Apps should be based on 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 2 members

Judging criteria & Marking scheme

Tier-1

70% for quality for paper Criteria: according to the SAE International and

30% for presentation Criteria: quality of slides, clarity of presentation and

20. Circuit Design

Purpose of the event

- To enhance the knowledge on basic circuit design with respect to the industrial application.

Expected Skills

- Acquire basic knowledge about circuit designing.

Prelims (round 1)	Circuit analysis (round 2)	Designing of circuit (round 3)
A set of 25 questions will be given to every team and 30 minutes is allotted for solving it.	A schematic circuit (including some questions) will be given to every team with specifications.	Each team will be given a sheet, where source and output of the circuit will be given.
Best of 10 teams will move to next round.	Teams should identify the circuit and write its application.	Teams should quickly design a circuit and they must obtain the output.

Competition Rules

- Team size: 3 students.
- Kit shall be provided at the time of event.
- No electronic devices are allowed during the time of event.
- Contestants must be an SAE member.

Team Size maximum 3 members per team

Judging Criteria for final round

S.No	Criterion	Marks
1	Knowledge about circuit	25
2	Product designing / specs	10
3	Accuracy of output	40
4	Number of components used	25
Total marks		100

Note: any other details on scoring can be had from the judges before the start of the competition.

21. 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

Tier1
Identifying the feature or a characteristic of the organism-35%

22. Digital Manufacturing

Purpose of the event

A Workshop on direct digital manufacturing (to be arranged by SAE)

Expected Skills

Round 1	Round 2
A preliminary round (technical quiz, written test) to shortlist teams, the test will be MCQ, testing the knowledge of the participants in the field of direct digital manufacturing.	A Final round, where the shortlisted teams will perform presentation on “Advances in Direct Digital Manufacturing”

Kits and aids expected

A place to conduct the written test (prelims).

A presentation with laptop (installed with MS-power point) and projector.

Team Size

Maximum of 3 Team members

Judging Criteria

S.No	Criterion	Marks
1	Content	25
2	Innovativeness in your ideas	40
3	Presentation skills	20
4	Question & Answer	15
Total marks		100

23. Design of Parts and Assembly

Purpose of the event

- This event tests the ability of the students to assemble different mechanical components and parts.

Description

- Each student has to assemble the parts of the given automotive component and the kinematic simulation has to be done.

Eligibility criteria

- Participants must have SAEINDIA membership
- Students participating in this event should have design knowledge of general mechanical components and have skill to model in software like NX SIEMENS, Solid works, Catia etc. check on the availability of the above software with SAEISS

Expected skills

Tier-1

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 next round.

Kits and aids expected

- Around 20 to 30 computers having designing software (NX SIEMENS preferably).

Team Size

- Around 75 to 100 participants can be expected.
- If the numbers of registrations are more we would make it a team event with 2 members per team.

Judging criteria

- Whoever finishes the functional assembly in the least time would be considered the winner and simulation is required to test the function of the assembly.

Tier-1

Best 10 team will shortlist to next

24. 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 2 members per team.

Round -1	Round -2	Round -3
20 Prelims questions.	Given diagram or part shall be detailed in the given format.	Component given and participants detailed in the drawing
30 teams shall be selected for round 2.	10 teams shall be selected for round 3.	

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).

25.Six Sigma

Concept

- To understand the lean concepts & six sigma methodology and techniques

Purpose of the event

- This event gives an overview of six sigma technique.
- Understand business processes and to improve them for time management / strategic planning and focus

Eligibility criteria

- Participants must have SAEINDIA membership
- Must have knowledge in Six sigma methodology
- Must have good Communication skills

Expected skills

Tier1
Good knowledge in six sigma

Competition rules

Tier1
25 questions to be answered in 15 minutes. Best of 8 teams will move to next round.

Kits and Aids expected

- None

Team size

- Team size: 2 students
- Number of teams for Tier-1: as many as possible

Judging criteria

Tier1

Quality of function analysis. Team with the highest score would go to the next level.

26. Engineering Problem Solving

Purpose of the Event:

- An industrial or day to day problem will be given for which solutions have to be found. The problem will be associated to mechanical/ electronics field of applications.

Expected skills

- Identify the existing problem that can be related to industry and day to day engineering problems
- Prepare a mini prototype of the newly designed or modified structure.

Competition rules

- Prelims will be conducted and from which 5 teams will be selected for final round.

Team Size

- Team size: 3per team

Judging criteria& Marking scheme

- Industry Related Problem-10%
- Changes made-70%
 - Concept
 - Cost
 - Efficiency
 - Maintenance
- Time taken for Solving-20%

Points to be considered while solving

- To what level the solution will change the current system
- Cost
- Availability of material
- Efficiency of the operation and related maintenance.

27. GEOMETRIC DIMENSIONS & TOLERANCE

Purpose of the Event

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

Expected skills

ROUND 1	ROUND 2
The participant has to know G D&T symbols extensively	The participant has to be able to solve problems based on G D&T

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

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

28. Cloud Computing

Background

The present era is said to be an era of information and the period of digitization. The digital information is generated in terabytes daily through various sources like smart phones, social networks, sensors, user generated content. This digitization has raised several issues with respect to data storage on cloud. In the future era of Internet, this explosion of raw data and dependence on data services will grow by four fold due to storage proliferation of data intensive services and the digital convergence of telecommunication, media and Information Communication Technology (ICT).

The next generation data models for storage delivery would migrate to cloud based infrastructure for storage which will be based on data objects with rich, extensible metadata and elaborated access methods. Such infrastructures will face several research challenges which need to be addressed in order to overcome limitations related to issues like storage access, mobility, cost, energy, security, interoperability, efficiency, etc.

Concept

Participants will be required to

1. Evaluate, select and implement foundational cloud computing services such as computer, network, and storage for a given business problem.
2. Evaluate, select and any one of network-related technologies to infrastructure design such as network communication protocols, sub netting, NAT, DNS, VPN, broadcast networking, and dynamic routing protocols.
3. Design and develop authentication processes at a departmental and organizational Level, controlling access to public cloud administrative capabilities and system access.
4. Develop policies and procedures for systems and application

Access to public cloud interfaces and services.

Event Blue Print

- Round 1
- Round 2
- Round 3

Round 1
<p>Systems Design/Deployment – When designing and deploying a web application, the fundamental building blocks of being able to scale is understanding how to implement an architecture that can scale. Participants will need to showcase their understanding in decoupling the database from the application, utilizing additional options and effective implementation of integration.</p> <p>Network Design – When scaling a web application and breaking up the workload into different tiers and services, the network design must ensure that only servers and services that should be public remain public. To ensure network security, the application should communicate with services on private networks where possible.</p> <p>High Availability – In today’s web applications high availability is an essential aspect. Participants will need to keep this in mind and implement ways to ensure the web application can deal with issues and still remain a running application.</p>
Round 2
<p>Scalability – In order to keep costs low when there is low usage and scale to meet high traffic to provide a consistent user experience, the application must scale or the application must be scalable. Scalability in every aspect of the web application allows the application to grow only where needed. Correctly implemented this goes hand in hand with monitoring and automation.</p> <p>Automation – Automation is one of the fundamental building blocks of being able to scale a web application. Automation of application deployment process, infrastructure provisioning automation and self-configuration.</p> <p>Security – When scaling a Web Application, security at every layer of the application is essential. Where network traffic is allowed to come from, who can access the servers, what permissions are applied to the servers and users, who has access to the databases and data.</p>
Round 3

Provide a detailed Study after Round 1 and Round 2

1. How Cloud computing can drastically reduce the Software Development time
2. Provide a Mathematical model for calculating the cost of transfer of in house to cloud environment

Materials Required

All the team members shall bring their own laptop with the appropriate software installed prior to the event.

Competition Rules

- A maximum of two/three students are allowed per team.
- Teams have to complete all the rounds.
- The teams should be able to complete the round1, round 2 and round 3 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.

29. Plant layout in manufacturing engineering

About:

All industries are feeling the pressure of digital transformation. Products and factories that make them continue to become smarter and more complex. Rapidly advancing digital technology is driving innovation everywhere

Manufacturers must rethink every aspect of their business and embrace digitalization. Manufacturers can predict the future by showing much greater flexibility in reacting to continuously changing customer demand and future orders

Purpose of the event:

The Judges will provide the challenge for the participants. Participants are expected to solve the challenge and show the result as expected by the judge

Competition rules:

- Maximum 3 participants per team
- The participants should complete the given challenge in the stipulated time
- No extra time will be given
- Participants are expected to bring laptops for presentation

Judging criteria:

- Judging should be done based on the presentation and solution presented by the team
- Feasibility, correctness and accuracy of the solution along with time taken should be taken into consideration

30. Embedded system Design

Origin of all Automation started from the core – Mainly starting from Low Level Embedded Controllers. Embedded Systems has brought about a revolution in Science. Uses of embedded systems are virtually limitless because every day new products are introduced to the market which utilize embedded computers in a number of ways.

Latest trend is that embedded systems are also part of Internet of Things (IoT) – a technology in which objects, animals or people are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. But Main concern is the security and privacy of the data which is shared to the cloud space or external devices.

What We Are Up To?

Focus on making Embedded System Design more resilient to threats, by designing and implementing reliable product. The challenge will have two phases: a **preliminary** qualification phase, where teams allowed to take a written test, describing their project and a **final phase**.

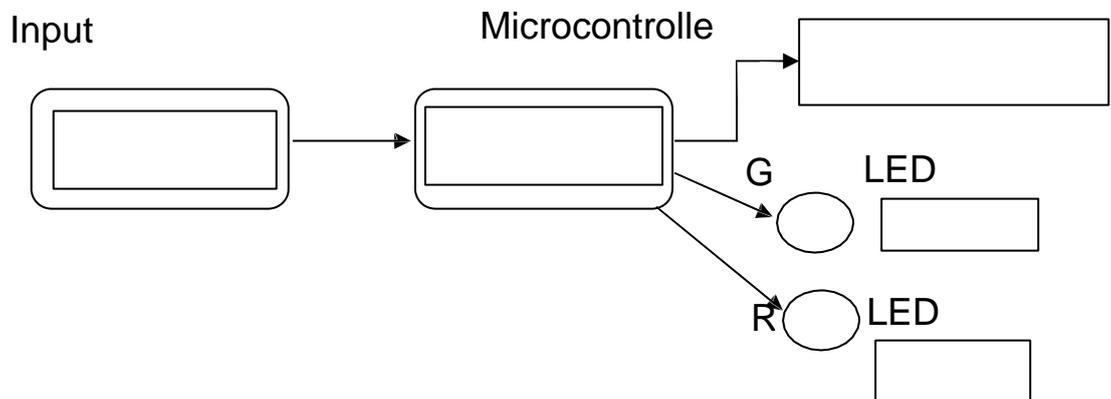
WHAT All We Have In This Challenge?

- Round 1 – Written Test
- Round 2 – Coding and Demonstration

Module Acceptance Test (MAT)	Criteria
Round 1	<ul style="list-style-type: none"> ➤ Written test (Hint: Working on Embedded Systems)

Round 2	➤ Write a program in embedded C language for a Microcontroller.
---------	---

- **Expectations for Round 2:** Write a program in embedded c language for microcontroller, as used in digital electronic key safe device to achieve following functions (Ref the below diagram)
- Power on LCD Display
 - Set and Clear Password via Keypad
 - Glow Green LED on Successful authentication
 - Glow Red LED on Failure with retry option.



Materials Required

- Participants are free to bring their own tools software's installed in their laptop.

Competition Rules

- A maximum of three students are allowed per team
- New Challenges will be given during the Problem Statement walkthrough session.
- Students are expected to design logics and build software pipelines which satisfies all the requirements of the Problem Statements.
- Teams which are able to complete the maximum number of rounds satisfying all the judging criteria will be declared as the winners.
- Students are motivated to use any technology to achieve the objectives of the Problem Statement.
- Any other doubt/rules shall be clarified with the judge before the start of the competition
- Judges decision will be the final.

Judges Criteria

- JC1::Technology used with Design Review
- JC2::Software code and Hardware demo review
 - JC3::Testing Techniques for solving the problem statement