Robotics and Intelligent System Community
Lovely Professional University
presents

Indo Asian Solar Challenge

2016 Inspiring Green Technology

RULES & REGULATIONS

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INTRODUCTION OF THE EVENT:

INDO ASIAN SOLAR CHALLENGE is a premier collegiate engineering competition which allows students to apply their engineering concepts in the design and fabrication of prototype solar race car as per Robotics & Intelligent System Community-LPU (RISC-LPU) specifications. The students must design and subsequently test the vehicle for efficient and reliable performance, and at the same time taking into considerations the market compatibility of the vehicle manufactured, cost efficiency etc. Through this event the students get an opportunity to develop technical as well as managerial skills and also know about real world problems. It is also an unique competition which helps in the Inter Domain Collaboration.

PART A: PURPOSE

Article 1: FUNDAMENTAL VISION AND SCOPE

- The Indo Asian Solar Challenge, hosted by the RISC-LPU, seeks to promote and celebrate educational excellence and engineering creativity. Fuelled by the spirit of friendly competition and teamwork.
- Indo Asian Solar Challenge is the creative integration of technical and scientific expertise across a range of exciting disciplines.

Article 2: MISSION

- The support and encouragement of bright young minds to succeed in the fields of engineering, the sciences, mathematics, business, in multi-disciplined experiential learning, and in subsequent careers.
- The creation of public awareness and enthusiasm, both for education excellence and engineering creativity itself, and for the technologies and practices that emerge from that excellence.

PART B: ADMINISTRATIVE REGULATIONS:

Article 1: Event Schedule

S.no	Activity (Reference)	Dates
1.	Registration Start (www.risclpu.in)	20th June 2015
2.	Last date for Submission of Team members Details	15th September 2015
3.	First time editing of Team Members	2nd November 2015
4.	Virtual Round (North Zone)	7th Nov 2015 & 8th Nov 2015
5.	Virtual Round (South Zone)	14th Nov 2015 & 15th Nov 2015
6.	Result of Virtual Round	22nd November 2015
7.	Video Submission	10th March 2016-17th March 2016
8.	Final Design Report Submission	15th March 2016-23rd March 2016
9.	College Level Technical Inspection	17th March 2016-20th March 2016
10.	Last date for Final Team Members List Submission	25th March 2016
11.	Dynamic Round	4th April 2016-8th April 2016

There might be some changes in the Virtual and Dynamic Dates (if required) due to bad weather, exams for maximum teams etc. Teams will be informed earlier and the decision will be taken through polling process in which team captain represent the entire team.

Article 2: ABOUT THE ORGANIZER

ROBOTICS & INTELLIGENT SYSTEM COMMUNITY profoundly known as RISC-LPU is the student organization in Lovely Professional University. The principle of the organization is "Learn, **Implement&** Share". The motto of the organization is to develop the technical skills and Inter Domain Collaboration among the students. It also encourages the students to work on various live projects. RISC-LPU also encourages the students to work on various innovative projects and Research Oriented Work.

The RISC-LPU shall be the official organizer of the Indo Asian Solar Challenge (the "Event"), and shall be responsible for all management oversight and application of the regulations for the Event.

Article 3: RULES & REGULATIONS

B3.1 Official Announcement

- All the official announcements and the information regarding the competition will be displayed on the official website of Indo Asian Solar Challenge. Our official website is www.risclpu.in and the official Facebook group of Indo Asian Solar Challenge is https://www.facebook.com/groups/indoasc/. After completion of registration, important information will be sent through the emails to the respective team mail Id. The rules will be same throughout the event and any amendments done will immediately be informed to all the participating teams. The Organizers reserve the right to revise these Regulations at any time.

B3.2 Rules of Campus

- All the teams are supposed to follow the rules and regulations of LPU. RISC-LPU reserves all the right to impound any team in case team does not follow the rules and regulations of LPU and Indo Asian Solar Challenge. All the rules throughout event will be same and if there any change, amendments will immediately be informed through E-mails, website or our face book page.

B3.3 Right to Impound

- During the event any registered team can be called for technical inspection and examination at any point of time and stage and can be questioned for any technical element related to the vehicle during the event to any team member.

B3.4Behaviour

- All the member of each and every team will have to follow the rules laid by LPU, during the competition. Any member' s failure to follow the rules will result in 20 % point reduction or elimination from the event. Arguments with officials may result in the team being eliminated from event.

B3.5 Vehicle Shipping

- The teams must ensure that their shipping agency or freight forwarder or commercial carrier complies with all the rules laid down by the government for inter-state transportation. The vehicle shipping may be a complex and lengthy process. It is the responsibility of teams to ship the vehicle on proper time so that it reaches the event-site before start of event.
- Teams must keep proper care during transport to avoid any damage to the vehicle. A proper care must be taken while selecting the mode of shipping (train/truck etc).

ARTICLE 4: ENTERING THE EVENT

B4.1 Registration

- Team Captain has to register the team online on www.risclpu.in by providing Team Name, Team Leader Name, College Name, Email Id, Contact Number, College Address, City, State, and Country.
- After Clicking the SUBMIT button a unique Registration Number will be generated, team captain is requested to save it and take the printout of the displayed page.
- After Online Registration, Team Captain will receive an response mail immediately confirming team registration from Registrations@risclpu.in

B4.2 Entry Fee

The Indo Asian Solar Challenge is not a commercial movement. The cost of staging an event over the five days and 100-130 km race are significant and the Organiser recognises that the basic costs of the movement must be borne by the Participants. The team have to pay the registration fee **INR 10,500(before the Virtual Round) +INR 2,500(For the teams who only clear the virtual round)** using any of the following payment modes:

- Cash deposit in RISC-LPU bank account.
  Account name: **Robotics and Intelligent System Community**
  A/C No. **4942002100000202 (Punjab national bank) [IFSC CODE : PUNB0494200]**

  (OR)
- Draw a Demand Draft **(D.D)** in favour of Robotics and Intelligent System Community, Punjab National Bank , payable at : **Chaheru**, and send us at:

  Ashish Singh (11203196)
  Boys Hostel 5, Bock A, Room No. 407
  Lovely Professional University
  NH-1 G.T Road
  Phagwara, Punjab
  PIN: 144411

- If the registration fee is cash deposited, team captain has to mail the scanned copy of deposit slip at indo.asc@lpu.co.in. Mention your Registration Id and Team Name and contact details.

- If the registration fee is paid using Demand draft, mention your Registration ID and contact details at the back of demand draft. Demand draft should reach us within 20 days from team registration date.

- After successful payment, an official will call you and confirm your Team registration. Also, the Team captain will get a confirmation email and Team Id will be provided in this mail.

- After receiving confirmation mail, team captain had to create a Gmail account with the mail id as "Team Name Team Id@gmail.com". For example if team name is "XYZ" and Team Id is "IASC234" then the mail id will be in format xyz234@gmail.com.

- This mail Id will be considered as Official Mail ID of the team. The organizers will respond to the mail received from this mail Id only. If any problem persists in creation of mail id team captain had to contact the organizer for legitimate solution.

Note: Team captain has to update all the team member details before 15th September, 2015. To update team member details, download the form "TEAM_MEMBER_DETAILS.pdf" from RISC-LPU official website and send a scanned copy of it after filling all the details to indo.asc@lpu.co.in from Official team mail.

Article 5: PARTICIPATION REQUIREMENTS

B5.1 INITIAL TEAM REQUIREMENT

- **Team Name**:

Every team should have an inspirational and meaningful name.

- **Team Logo:**

Every team should have an attractive team logo (Not downloaded from internet or copied).

- **Team Captain:**

Every team requires a team captain and vice team captain.

- **Discipline:**

Every team member must be undergraduate / diploma student or pass out student only after the approval from their respective college/ University.

- **Driver:**

Every team must have minimum two drivers; driver must be minimum 18 years old. The driver should have a valid driving licence and we can verify that any time during event.

- **Faculty Advisor:**

Every team requires **two faculty advisors** (One from Mechanical department and one from Electronics or Electrical department) appointed by the college/University who will provide guidance as needed throughout the solar car design, building, and testing process.

Status:

Each team is supposed to have a Faculty Advisors appointed by the college/university. At least one of the Faculty Advisors is required to accompany the team to the competition and will be considered by competition officials to be the official college/university representative.

Responsibilities:

Faculty Advisors may advise their teams on general engineering and engineering project management theory and act as guide to them for this project. The Faculty advisors are allowed to attend virtual round, static & dynamic events along with their team at event site but will not be allowed to provide answers or justifications for any question on behalf of team. He/she can also not perform in the dynamic event on behalf of the team members.

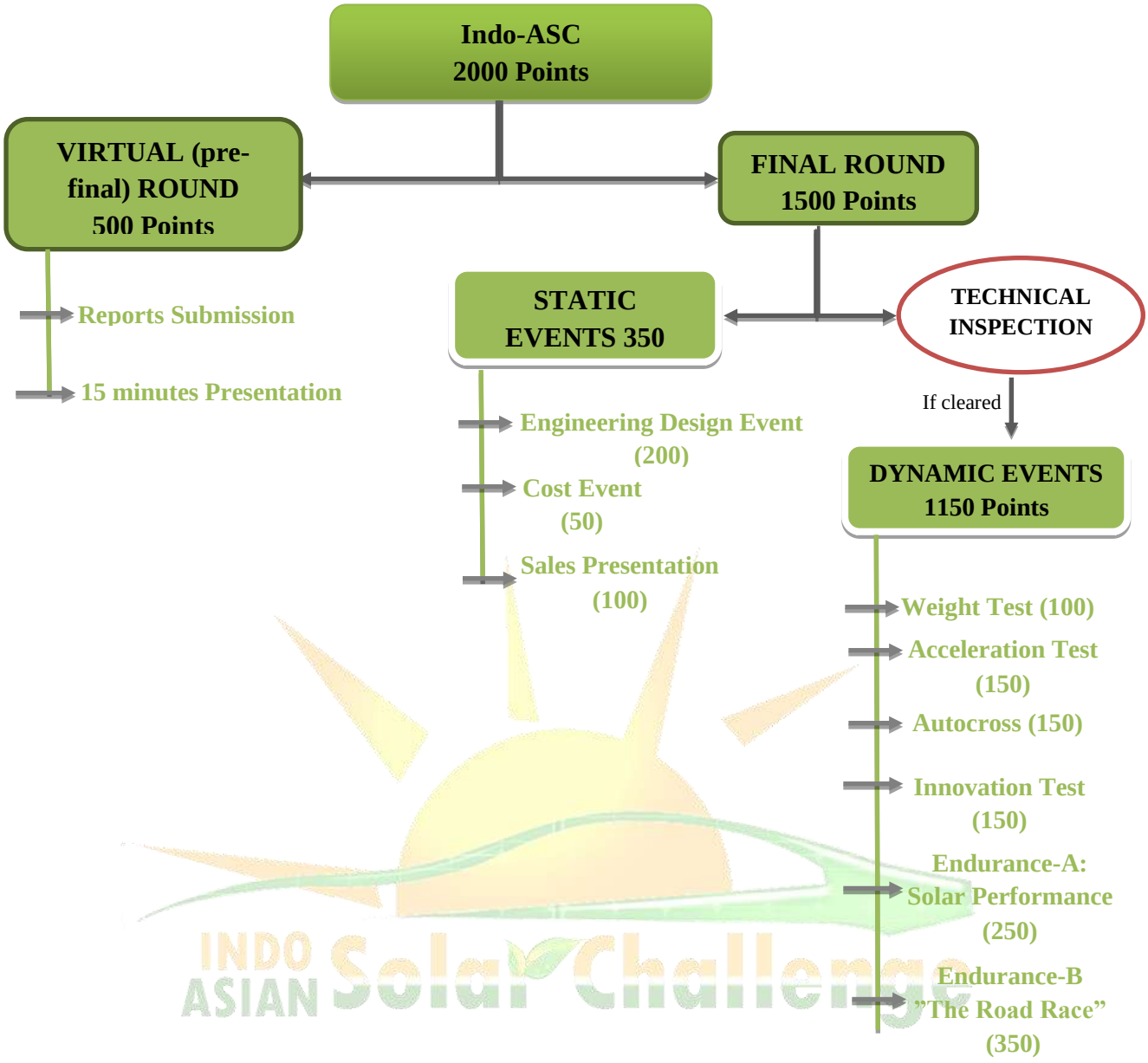
Limitations:

Faculty Advisors should not design any part of the vehicle nor directly participate in the development of any documentation or presentation. Additionally, Faculty Advisors may not fabricate nor assemble any components, nor assist directly in the preparation, maintenance, testing or operation of the vehicle. In Brief – Faculty Advisors may not design, build or repair any part of the vehicle. But they can support their team for proper upkeep of vehicle in case of any breakdown. Also it is recommended that all documentation of team should be verified by the Faculty Advisor.

- **Team Member:**

Every team require **minimum 8 members and maximum 25 members**.

NOTE: Multiple teams can participate from same college/ university in Indo Asian Solar Challenge, but every team should have different Team name and all the data given in the section Team Requirements.


Indo-ASC
2000 Points
VIRTUAL (pre-final) ROUND
500 Points
FINAL ROUND
1500 Points
Reports Submission
15 minutes Presentation
STATIC EVENTS 350
TECHNICAL INSPECTION
If cleared
Engineering Design Event (200)
Cost Event (50)
Sales Presentation (100)
DYNAMIC EVENTS
1150 Points
Weight Test (100)
Acceleration Test (150)
Autocross (150)
Innovation Test (150)
Endurance-A: Solar Performance (250)
Endurance-B "The Road Race" (350)

PART C: TECHNICAL REQUIREMENTS

Article 1: GENERAL DESIGN REQUIREMENTS

C1.1 Vehicle Configuration

C1.1.1 Vehicle must have minimum three (3) or more wheels not in a straight line.

C1.1.2 The points of contact between the tyres and the road must be symmetrical about the longitudinal centreline of the vehicle.

C1.1.2 The steering system must be able to control (simultaneously) at least two wheels.

C1.1.3 Maximum vehicle dimensions should not exceed 190 cm by width and 300 cm by length. It will be measured at the widest point with the wheels pointing forward at static ride height i.e., bumper to bumper dimension.

C1.1.4 Front, side and rear impact bumpers are compulsory. The front and rear bumpers must cover the wheels. The bumpers must be the outer most of vehicle including the solar panels.

C1.1.5 The smaller track width (front or rear) must be at least 75% of the Wheelbase of the vehicle.

C1.1.6 The three wheeler vehicles must have the tadpole configuration. Delta configuration is not allowed.

C1.2 Braking System

C1.2.1 The vehicle must be equipped with a braking system that is operated by a single control. The braking must be actuated by Foot Pedal.

C1.2.2 Braking effort must be applied to at least two wheels in four wheelers and at least on a wheel for a three wheeler.

C1.2.3 Brake by wire and linkage is prohibited. The braking must be actuated hydraulically.

C1.2.4 The Brake pedal travel should be restricted after some distance by some kind of locking mechanisms.

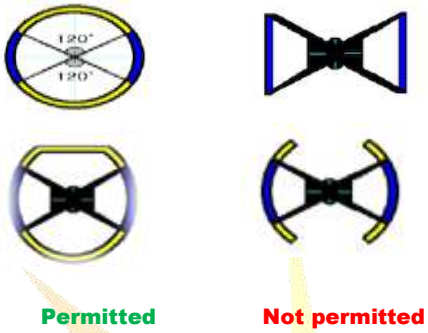
C1.2.4 The vehicle must be able to stop within a distance of 5 metres at a minimum speed of 25 kmph.

C1.3 Suspension

Teams may or may not use suspension system in their vehicle depending on their choice, but if any team wishes to use the suspension system, it must be used in all wheels and a total travel of at least 2 inches must be there. That is 1 inch of jounce and 1 inch of bounce.

C1.4 Steering

C1.4.1 The steering system must be controlled by a steering wheel which conforms to one of the following permitted designs.



C1.4.2 Steer by wire or electrically actuated steering is prohibited. Allowable free play is restricted to 5 degrees.

C1.4.3 There is no restriction on the steering ratio.

C.1.5 Reversing mechanism

Teams may or may not use Reversing mechanism but it is suggested to all the teams to use reversing mechanism (Vehicle will able to be driven backwards under their own power with the driver seated in the normal position).

C.1.6 Horn

An audible warning device must be permanently fitted to the vehicle. It must be capable of giving sufficient audible warning of the presence of the Vehicle.

C1.7 Terrain Capability

C1.7.1 Vehicle must be capable of safe operation over black top roads of India.

C1.7.2 The vehicle must have a minimum ground clearance of 2.5 inches (excluding the sprockets, disks) measured after driver sitting in the vehicle.

C1.8 Driver Requirement

Teams must have minimum two drivers. Each having a valid driving licence for four wheeler vehicles. Individual medical/health insurance issued by government of India is required for at least 2 drivers and is the sole responsibility of the participant. Teams will be asked to submit these documents at the time of main event during on-site registration. No medical insurance will be provided by Indo Asian Solar Challenge organizing Board.

C1.9 Vehicle Ergonomic Capacity

As a prototype of commercial product, the design intent should accommodate drivers of all sizes. The largest driver must be able to meet minimum clearances, and fit into a comfortable driving position, while wearing the entire required driver's equipment. The smallest driver must be able to comfortably reach all of the vehicle's controls.

* *Driver height Range in between 5 feet to 6.2 feet.*

C1.10 Material Selection

Teams are free to use any material of AISI or ASTM standard (seamless pipes) fabricating the chassis, but it should full fill the safety requirement.
For body works teams can prefer glass fibre, carbon fibre, GI sheet, or any other material which is water resistant and fire resistant.

C1.11 Lock Nuts (nylon nut):

Use of Lock Nuts is compulsory in Wheels, Motor mounting, Suspension system, and Steering system in the vehicle. Shown below is a snap of lock nut.

C1.12 Push Bar

Vehicle must have a Push bar which should capable to push and pull the vehicle during the events to take the vehicle to the different event sites. Do not push your vehicle with hands, if found, penalty will be applicable.

C1.13 Jack Point

There must be two jack points in the vehicle, one in front and the other in the rear end. The jack points must be coloured red.

C1.14 Vehicle cost

The solar vehicle must be manufactured within Rs. 1, 25,000. All the bills should be provided during the marketing presentation.

C1.15 Throttle

The throttle or the acceleration must be actuated by foot pedal only.

C1.16 Seat and Seat belt

The vehicle should have fixed driver seat and seat belt; seat belt can be of any type depending on the requirement of the vehicle. Seat belt must be minimum 3 point seat belt used in the car, it has the capability of self-locking. Use of OEM seat belts is recommended. Normal shoulder straps, side release buckle straps, belts with metal cam lock buckles etc cannot be considered as seat belts.

C1.17 Shoes, Gloves and driver suit

It is compulsory for the driver to wear shoes, hand gloves and driver suit (should be SFI rating).

C1.18 Wiring

Wiring should not be below the chassis. Wiring should not be going through the metallic pipes.

C1.19 Firewall

There should be a firewall separating the motor, transmission and the cockpit to protect the driver.

C1.20 Fire extinguisher

Teams should install a fire extinguisher of minimum 1kg.

C1.21 Helmet

Driver must wear an ISO certified helmet throughout the race.

Article 2: REQUIRED POWER AND TRANSMISSION

C2.1 Motor

C2.1.1 Teams can use DC motor of any type.

C2.1.2 Maximum motor power should not exceed 1500 watts (at peak).

C2.1.3 No constrain on torque and RPM.

C2.1.4 Maximum operating voltage to Motor and controller should not exceed 48 volts.

C2.2 Controller

Teams are allowed to use any type of controller suited for the motor but at the time of TI team have to show the specification of controller.

C2.3 Transmission

C2.3.1 Teams are free to use any transmission, such that maximum speed of the vehicle on a plain terrain must not exceed 60 km/h on full throttle.

C2.3.2 Teams can plan to install reverse gear for reverse drive of vehicle. The adapter for motor &Transmission is to be designed and installed by students as per the type of transmission used.

C2.3.3 The transmission system should be clearly visible at the time of engineering design event.

Article 3: ELECTRICAL SYSTEM

C3.1General Electrical System Overview

C3.1.1The electrical system must include at least two power sources:

A. **Battery pack**: Motor, controller, Brake light and all other equipment should use this power source (For Electrical Innovations the power supply must be taken from this battery Pack or Solar Panels).

B. **Solar power**: To charge batteries and supply power for vehicle to run directly on solar.

C3.1.2 The electrical system must include at least two kill switches, a brake light and horn. The kill switches must disconnect all the power supply sources. The kill switches must NOT disconnect the brake light. The brake light must operate regardless of the kill switch setting. The brake light, and any reverse light and alarm, must be powered whenever the vehicle is in motion.

C3.2 Battery

C3.2.1 Teams can use either Li ion battery or Lead acid battery.

C3.2.2 Voltage output of battery pack should not exceed by 48 volts.

C3.2.3 Maximum Current capacity of battery pack should not exceed 80 Ah (ampere-hours).

C3.2.4 Batteries must be able to provide power to safety items (brake light) for the duration of entire event.

C3.3 Kill Switch – Locations and Orientation

(A) **Cockpit Switch** – The cockpit switch must be located in the front of the cockpit within easy reach of the driver with the safety harness tight. The switch may not be mounted on a removable steering wheel assembly.

(B) **External Switch** – The external switch must be mounted on the driver's right side of the vehicle, on a panel generally perpendicular, the switch must be mounted rigidly, with no sharp edges nearby. It must not be necessary to reach inside the roll cage to actuate the switch.

C3.4 Brake Light

C3.4.1 The vehicle must be equipped with a red brake light.

C3.4.2 Brake Light Switch: The brake light must be activated by brake pedal pressure.

Article 4: SOLAR POWER

C4.1 Teams are free to use any type of solar panels, solar cells or solar paints.

C4.2 Maximum area of solar panels/cells/paint use is limited to 120% of the area of your vehicle.

Note: *Area of your vehicle= (maximum length X maximum width) of vehicle (end points of bumpers).*

C4.3 Teams can make their own series/parallel combination with solar panels/cells according to their requirement.

C4.4 Maximum charging voltage, i.e. when solar system is connected to batteries, should not exceed 55 volts.

PART: D VIRTUAL ROUND

Article1:Overview

Virtual round is a pre-final round, in which all the teams have to give a 15 minutes presentation illustrating their vehicle design and other vehicle specifications in front of judges. In virtual round, teams have to testify that they have necessary knowledge and research work done to make this vehicle. Only 5 members have to present their design during the Virtual Round. Only Faculty Advisor other than 5 presenting team members is allowed to witness the presentation of their team; but answers/justifications by faculty advisors are restricted.

Article 2: SCORING

S.NO	CATEGORY	POINTS
1.	Presentation	100
2.	Design Reports	100
3.	Innovation	100
4.	Electric and solar System	100
5.	Business Plan & Cost Report	50
6.	Vehicle CAD Design	25

7.	DFMEA & Gantt chart& DVP	25
	TOTAL	**500**

Article 3: REPORTS SUBMISSION

D3.1 Teams have to submit hard copy of all the reports mentioned below to the judges before starting the presentation:

- **Overall design report**
- **CAD File**
- **FMEA**
- **DVP**
- **Gantt Chart**
- **Cost Report**
- **Technical Specification sheet**
- **Business plan**
- **Report on electric and solar.**

D3.2 Overall design report

This report should consist data of following departments and their calculations.

- Design
- Steering
- Braking
- Suspensions (if used)
- Innovation (including the process flowchart, circuit diagrams and calculation if any)

It is mandatory to show the calculations of the steering, braking and suspension (if used).

D3.3 CAD files-This includes a document with all the views of the chassis, assembled vehicle and vehicle with Bodyworks.

D3.4 FMEA- Failure Modes Effect Analysis

It is a structured approach to:

>> Identifying the ways in which a product or process can fail
>> Estimating risk associated with specific causes
>> Prioritizing the actions that should be taken to reduce risk
>> Evaluating design validation plan (design FMEA) or current control plan (process FMEA)

D3.5 Design Validation Plan-The design validation plan is the assurance that a product, service, or system meets the needs of the customer and other identified stakeholders. It often involves acceptance and suitability with external customers. All the virtual and real time tests and analysis are to be included in the design validation plan

D3.6 Gantt chart-Gantt chart includes all the process during manufacturing of vehicle from starting date to final date. This chart is basically the management of the project and distribution of different tasks in the team members with completion deadlines.

D3.6 Cost report- Teams have to show their estimated cost of vehicle. Each and every component's cost should be mentioned in the report.
Teams have to give the comparison cost report of the actual manufacturing (using second hand component) cost and the virtual manufacturing cost.
Note: *Team have to give minimum 2 dealer name for each and every component they are going to use in their vehicle.*
For Example:

Component	Dealer 1 Contact & address	Dealer 2 Contact & address

D3.7 Technical Specification Sheet-In this report team have to tabularize all the specifications of all the components to be used in vehicle. Such as all the steering related angles, forces, dimensions, etc.

RUNNING CAR VIDEO SUBMISSION (All items mentioned below are MANDATORY)

The video must be submitted no later than 17th March 2016. Earlier submissions are welcome but not before the 10th March 2016.

- The video must be shot in **HD**, **uncut and of sufficient quality** (focus, resolution, lighting, etc.)
- **Video submission is Mandatory.** Failure to submit a video with the requirements given below may lead to the penalty till 20th March and disqualification of team after 20th March 2016.
- The penalty per day will be 20 points. If a Video is not submitted with the requirements given below then it will be considered as not submitted.

Video Requirements:

- The car must be run on dry asphalt (no rain or standing water).
- The car must not be on public roads.
- No other self-propelled vehicles within the driving area.
- Spectators have to keep a minimum distance of 25m from the driving area in all directions.
- The entire video must be continuously shot from the driver getting in the car (fully equipped), tightening harness (one member can assist), starting the motor, performing the manoeuvres as described below and coming to stand still under braking.
- Driver must wear full safety gear (Fire resistant Suit, helmet, seat belt, gloves etc.)
- At least one person must be holding Fire Extinguisher at all times and be prepared to use it. This student must be seen on video during the motor start and when the car first moves.
- Motor must be started by driver without any external help.

The car must:

- Move forward to a distance of 75 metres.
- Make a U-turn of which the outside radius will be maximum 7 metres and delimiting by one cone or pole at the U-turn centre and minimum of 5 cones or poles on the outside line.
- Accelerate to the speed of approximately 30kmph after taking U-turn and travel to distance of 75m i.e., the starting line.
- After crossing finish line brake and lock the wheels. It is the responsibility of team to provide a video where the wheels are locked.
- At the conclusion of video test, driver must bring the car to complete rest, and egress in less than 5 seconds.

PART E: FINAL ROUND-STATIC EVENTS (300 points)

Article 1: SCORING

Event Name	Points
Engineering Design Event	200
Cost Report	50
Sales Presentation	100
Total	**350**

Article 2: ENGINEERING DESIGN EVENT

E2.1Objective and Overview

The objective of the engineering design event is to evaluate the engineering effort that went into the design of the vehicle and how the engineering meets the intent of the market. Students will be judged on the creation of design specifications and the ability to meet those specifications, computer aided drafting, analysis, testing and development, manufacturability, serviceability, system integration and how the vehicle works together as a whole. Each of these parts of the engineering product

development cycle will be judged within the following subsystems: Steering, Brakes, Drive-train/Power-train, Suspension (if used), Chassis and Ergonomics.

E2.1.1 The vehicle that illustrates the best use of engineering to meet the design goals and the best understanding of the design by the team members will win the design event.

E2.1.2 Final Design reports submitted will be cross checked and any deviation from the data given in report will lead to point deduction.

E2.2 Scoring Formula

- Final design report submission (compulsory but no marks)
- On site design evaluation (200 marks)

E2.3 Final Design Report - Required Submission

The design evaluation judging will start with submission, before the event, of a Design Report. Soft copy of the design report must be submitted before 23rd March 2016 at official mail of Indo Asian Solar Challenge i.e. indo.asc@lpu.co.in. Hard copy of final design report must be submitted on day-1 of the event. The Design Report will be reviewed by the design judges who will ultimately judge the team and vehicle at on-site Design Evaluation.

E2.3.1 Following Reports have to be submitted only.

- Overall Design Report
- Design Validation Plan (DVP)

E2.3.1 The Design Report must not exceed fifteen (15) pages including table of contents and cover page. All pages must be either 81/2" x 11" or A4.

E2.3.2 The Design Report should contain a brief description of the vehicle with a review of your team's design objectives, vehicle concepts, and a discussion of any important design features. Note or describe the and back-up data should be brought to the competition and be available, on request, for review by the judges.

E2.3.3 If the data in final design report has a deviation more than 20 % than that of reports submitted during virtual round, marks will be deducted.

Comment: *Note that while the Design Report is not explicitly scored, it may be considered to be the "resume of your car", preparing your on-site Design Evaluation judges to view your design effort in its most positive light. Failure to convincingly point out your design success in the Design Report will almost certainly lead to failure of your design judges to be impressed by your success.*

E2.3.4 The Design Report must be submitted electronically in Adobe Acrobat Format (PDF). The document must be a single file. File name must be in the format "team ID_final_design_report". E.g. team ID **IASC011** will have file name as "IASC011_final_design_report"

WARNING: *Failure to exactly follow the above submission requirements may result in exclusion from the Design Event. If your file is not submitted in the required format or is not properly named then it cannot be made available to the design judges and your team will be excluded from the Design events.*

E2.3.5 Penalty for Late Submission or Non-submission

Late submission or failure to submit the Design Report will be penalized at negative ten (-10) points per day. **If your Design Report is received more than five (5) days** late it will be classified as "Not Submitted" and your team will not participate **in the Design Event and will receive zero (0) points for design.**

E2.4 On-Site Design Evaluation

In onsite design evaluation, Teams will be evaluated on the basis of their design and questionnaire. The designer/s of top scorer team will be given "THE BEST DESIGN AWARD".

E2.4.1 The design judges will evaluate the engineering effort based upon the team's Design Report, responses to questions, and an inspection of the car.

E2.4.2 The design judges will inspect the car to determine if the design concepts are adequate and appropriate for the application (relative to the objectives set forth in the rules).

E2.4.3 It is the responsibility of the judges to deduct points if the team cannot adequately explain the engineering and construction of the car.

E2.4.4 Support Material

Teams may bring with them to Design Evaluation any photographs, drawings, plans, charts, example components, or other materials that they believe are needed to support the presentation of the vehicle and the discussion of the their development process. Use of laptop or notebook computers, posters, and binders is allowed, but projectors may not be used.

Article 3: COST REPORT

E3.1 Teams have to give a brief overview of design features or fabrication processes that are innovative or are expected to result in significant cost savings. Teams may also use the overview to explain items or processes that might appear to be discrepancies within the report. The overview section is limited to a maximum of four (4) pages. In short teams have to explain the ways in which they have reduced the total cost of fabricating this vehicle.

E3.2 Also, teams have to submit copies of receipts, invoices, price tags, catalogue pages, on-line prices, or other documentation, to substantiate the costs of the parts and materials of any item costing more than Rs. 200. Cost documentation must be at full retail Indian prices. The report is expected to be comprehensive, well documented, truthful and accurate.

E3.3 If details of parts are found missing in the report, severe penalties will be applied in terms of adding the cost of missing part into projected cost by multiple times.

[Final Cost = Cost Projected in Cost Report + (2 x Cost of missing Equipment)]

Article 4: SALES PRESENTATION

E4.1 Presentation – Objective

The aim of the Marketing Presentation is to provide an opportunity for the engineering students to prepare a strategic business model of establishing a firm which can produce their own design at a certain rate (say 10,000 vehicles per year) and market it.

E4.1.1 For the purpose of the presentation, teams are to assume that the judges are to be a mixed group of corporate executives who may have experience in marketing, production and finance as well as engineering.

E4.2 Presentation – Format

Teams are advised to prepare the model by working out on the following points in the presentation:

1. Unique Selling Proposition (USP)
2. Market/Customer Survey (to analyse the product demand)
3. Different concepts & variants
4. Plant layout for mass production
5. Cost of product in mass production
6. Break-Even Analysis (in terms of time & quantity)
7. Return on Investment (in terms of time & money)
8. Marketing strategies (sales & after sales)

Three team members may make the presentation to the judges. The presentation itself is limited to a maximum of ten (10) minutes.

E5.2.1 Following the presentation there will be an approximately five (5) minute question period.

E5.2.2 Only the judges are permitted to ask questions. Any team member on the presentation floor/stage may answer the questions even if that member did not speak during the presentation itself.

E4.3 Presentation – Scoring

E4.3.1The presentation event will be scored based on such categories as

(1) The content of the presentation,

(2) The organization of the presentation,

(3) The effectiveness of the visual aids,

(4) The speaker's delivery, and

(5) The team's responses to the judge's questions. The team's score will be the average of the individual judge's scores.

E4.3.2The team that makes the best presentation will receive the highest score regardless of the finished quality of their actual vehicle.

PART F: FINAL ROUND-DYNAMIC EVENTS

The Dynamic events will be held in Lovely Professional University. Teams have to reach the university with their vehicles and team members. At least half of the team members should be present at dynamic events

Article1: TECHNICAL INSPECTION

F1.1 Technical Inspection Overview

Technical inspection will consist of three (3) separate parts as follows:

- Rulebook Inspection
- Safety Inspection
- Electrical Inspection

F1.1.1Technical Inspection - Pass/Fail

All vehicles must pass technical inspection before they are permitted to operate under power or to participate in Dynamic Events.

F1.1.2 The inspection will determine if the vehicle satisfies the requirements and restrictions of the Indo Asian Solar Challenge rules.

F1.1.3If vehicles are not ready for technical inspection when they arrive at the inspection site, they will be sent away in pit to perform required changes.

F1.1.4Teams will be given maximum three chances to clear the Technical inspection.

F1.1.5Any vehicle may be re-inspected at any time during the competition and correction of any non-compliance will be required.

F1.1.6Drivers Present: All drivers must be present at technical inspection with their valid license. Without driver, Technical inspection will not be started.

DRIVING OFF-SITE IS ABSOLUTELY PROHIBITED. TEAMS FOUND TO HAVE DRIVEN THEIR VEHICLE AT AN OFF-SITE LOCATION MAY BE EXPELLED FROM THE COMPETITION.

F1.2Rulebook Inspection

In this inspection the technical inspector/s will check whether rulebook is followed in manufacturing the vehicle or not. Any deviation from rulebook will lead to point deduction.

F1.3 Safety Inspection

- This inspection will include an examination of vehicle and driver safety.
- **Helmet:**
  An ISI or ISO certified helmet should worn by the driver while driving the vehicle
- Test of driver exit time to ensure that driver can come out of vehicle easily in any emergency.
- **Kill switches** and other safety requirements will be tested.
- Proper functioning of **brake light & horn** will be checked.
- Driver must come to Technical Inspection by wearing the driver suit.
- **Seat and Seat belt:**

The vehicle should have a fixed driver seat with seat belt. Use of 3-point seat belts is mandatory. Use of OEM seat belts is recommended. Normal shoulder straps, side release buckle straps, belts with metal cam lock buckles etc cannot be considered as seat belts.

- **Shoes and Hand Gloves:**

It is compulsory for the driver to wear a hand glove and proper shoes as per his/her comfort (prefer sport shoes).

F1.4 Electrical Inspection

F1.4.1 Electrical & electronics used in the vehicle will be inspected. All the wirings should be safe and high current circuits must be isolated from driver.

F1.4.2 Batteries must be mounted with sound engineering practice and not come loose during any part of event. Battery terminals must be insulated by using rubber (bicycle tube etc.).Failing this, the technical inspectors may debar the team from the dynamic events.

F1.4.3 Battery pack should be mounted/connected in such a way, that it can be removed/disconnected during endurance round A. Use of mechanical fixings such as nut bolts to hold the batteries are recommended.

F1.4.4 Battery terminals should be tight and should not generate a spark during the race.

F1.4.5 Solar power circuits will be checked.

F1.4.6 The vehicle must not have chances of electrical shock. Loose connections and un insulated electrical parts should not be there.

F1.4.7 An appropriate MCB must be placed in series with the positive terminal of battery pack, Teams can use the same for cockpit kill switch also.

F1.5 Self Certification Check Sheet- Pre-inspection Required

F1.5.1Before bringing their vehicle to technical inspection each team must **(1)** pre-inspect the vehicle for compliance with the rules, **(2)** complete the official Self Certification Check Sheet (Download from www.risclpu.in& also mailed at team's e-mail) , **(3)** have the completed check sheet signed by the faculty advisor and team captain.

NOTE: Teams presenting Self Certification Check Sheets that are **(1)** incomplete, **(2)** inaccurate (i.e. do not correspond to the actual condition of the vehicle) **(3)** are found to have the items not in accordance with the rules, or **(4)** do not represent a serious effort at pre-inspection will be denied inspection at that time and sent back to the end of the inspection line.

F1.6 "As-approved" Condition

F1.6.1 once a vehicle has passed technical inspection its configuration may not be modified. All accessory components such as roofs, solar plates, bumpers, etc. are considered part of the configuration and must remain on the vehicle at all times.

F1.6.2 Approved vehicles must remain in "as-approved" condition throughout the competition. Any repairs of a part that is not identical as the broken part must be approved prior to the repair by judges or organizers.

F1.6.3 Non-identical parts not approved will be subject to an appropriate performance penalty.

F1.6.4Minor adjustments permitted by the rules and normal vehicle maintenance are not considered modifications.

After clearing the Technical Inspection round (T.I. round), a T.I. OK sticker will be awarded
to your vehicle which will make it eligible for the next round i.e. Brake Test round

Article 2: SCORING

S.NO	CATEGORY	POINTS
1.	Weight Test	100
2.	Innovation Test	150
3.	Brake & Acceleration Test	150
4.	Autocross	150
5.	Endurance A (solar performance)	250
6.	Endurance B	350
TOTAL		1150

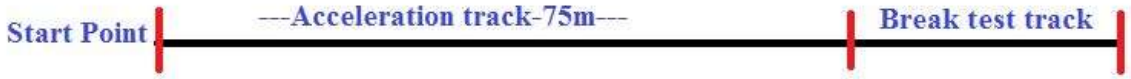
The organizers will provide the electrical supply to the team's pits. Teams are required to bring their own tool kits (Ratchet set, spanners, hand grinder and welding set as per their requirement). The organizers will not provide any tools. The organizers will provide Electric Arc Welding. There will be two welding sets in the welding arena. Every team gets a time of 20 minutes for welding.

Article 3: BRAKE & ACCELERATION TEST (150 points)

F3.1Overview

F3.1.1 Brake test is a mandatory process, without passing this test vehicle will not be allowed to proceed further. Each vehicle will be given 3attempts to pass the brake test

F3.1.2 The vehicle has to accelerate at its maximum along a 75m track and then apply brake and stop the vehicle within the distance of 5metres at a minimum speed 25Kmph.



F3.1.3 The time taken by the vehicle for covering 75 m length will be considered to determine the acceleration of vehicle.

F3.1.4If the vehicle did not stop within the distance of 5 metres the brake & acceleration test will not be cleared and team has to attempt again.

F3.1.5If the team has cleared the brake test they may take one more attempt to improve their acceleration time.

F3.2 Scoring Formula

Acceleration Score = 150 x ($t_{longest}$ - t_{yours})/($t_{longest}$ - $t_{shortest}$)

where:

$t_{shortest}$= fastest time by any vehicle

t_{yours}= time for the vehicle to be scored

$t_{longest}$ =the lesser of: a) slowest time by any vehicle; b) 2.5tshortest

Article 4: WEIGHT TEST (100 points)

F4.1 Overview

After brake test, weight test will be conducted. We will weight your vehicle in this round and lowest weight vehicle will get the "Light weight award". The weight of vehicle must not exceed **300 Kg** excluding the driver's weight.

F4.2 Scoring Formula

Lightweight score=$100 \times (wH - wY) / (wH-wL)$

wH= Weight of heaviest vehicle.

wY= Weight if your vehicle.

wL= Weight of lightest vehicle.

Article 5: AUTOCROSS (150 points)

F5.1 Overview

F5.1.1 Auto cross is an endurance test. Here we will check the endurance of the vehicle in all manners. Vehicle's manoeuvrability, handling ease, ergonomics, manufacturing strength, safety will be checked out. It will combined with an integrated testing mechanism that will also check the acceleration, braking, steering, cornering, overtaking capabilities of the vehicle without hindering other vehicles movement

F5.1.2Each team gets two attempts with same or different drivers. Best out of two attempt score will be taken into consideration. Timings will be checked out using electronic system or stop watches.

F5.1.3 Track Details will be given at the time of event.

F5.2 Scoring Formula

Autocross score = 150 points x (Tl- Ty)/ (Tl -Ts)

Where:

Ts= Minimum time taken by any vehicle

Ty= time for the vehicle to be scored

Tl= maximum time taken by any vehicle

F5.3 • **Penalties-Cones down Or Out-** Two seconds / cone, including any after the finish line.

20 seconds penalty if any part of vehicle leaves the track.

Article 6: INNOVATION TEST (150 points)

F6.1 After autocross event, judges will visit into the pit area where all the innovations done in the vehicle will be tested. Points will be awarded on the basis of concept, real world application, effectiveness and working of the innovation. Judges can ask question regarding innovation from any team member. The innovation must be properly fitted in the vehicle.

Article 7: ENDURANCE A -SOLAR PERFORMANCE (250 points)

F7.1 Overview

F7.1.1In this round, vehicle has to cover a specified distance, to be given at the time of event, using solar energy only.

F7.1.2 Teams have to line up in the track removing Battery pack from their vehicles.

F7.1.3 Vehicles which are not able to run on solar power, will be awarded zero points in this round.

F7.2 Scoring Formula

Vehicle Type	ENDURANCE-A score
Running directly on solar	**250 points x (Tlongest – Tyours)/(Tlongest - Tshortest)**

Tshortest = minimum time by any vehicle

Tyours = time for the vehicle to be scored

Tlongest = maximum time taken by any vehicle

Article 8: ENDURANCE-B -- "THE ROAD RACE" (350 POINTS)

F8.1Overview

F8.1.1Vehicle has to cover a distance of approx. 130 km in a maximum time limit of 5 hours.

F8.1.2 The vehicle reaching the 130Km finish point fastest will be the winner of this round and rest teams will be given points relative to the winner team.

F8.1.3 Teams can change their driver as many times on the check point.

F8.1.4The vehicles not completing the whole race will be evaluated on the distance they are covering from the start point.

F8.1.5 If none of the teams are able to complete at least 100Km in given time, there will be no winner in the Endurance B round. But the points will be awarded.

F8.2 Track Details

The track detail will be uploaded on our official website www.risclpu.in or send through the official mail.

F8.3 Scoring Formula

VEHICLE CATEGORY	ENDURANCE-B SCORE
Group-I: Vehicle completing the race	**350 points x $(T_L - T_y)/(T_L - T_S)$**
Group-II: Vehicle not completing the race	**Lowest score from Group-I x (D_{yours}/D_{course})**
Group-III: No vehicle completes the race	**150 points x (D_{yours}/D_{course})**

where:

T_S= smallest time taken by any vehicle

T_y= time for the vehicle to be scored

T_L= maximum time taken by any vehicle;

D_{yours} = Distance covered by the vehicle to be scored.

D_{course}= Distance from start line to finish line.

F8.4 Command FLAGS

Flag colour	Meaning
Green / whistle	Start / Everything is good.
Red	Stop immediately and report to judges.
Checker Flag	Finishing line.
Yellow Flag(steady)	Something happened ahead slow down the car.
Yellow flag (waving)	Something happened ahead prepare for a halt.
Blue Flag	Stop by penalty box.
Black flag	Warning by judge/ penalty added (should dr properly).

Penalty will be applicable on the team for not following the flags as follows

Flags	Penalty percentage
Red flag	100%
Blue flag	50%
Yellow flag	10%

PART G: Other PENALITIES

CASE	PENALTY
Violation or Breaching of Rules	25-50 points depending on severity of case
Misconduct with volunteers or officials	100 Points
Tampering with vehicle after Technical Inspection	Disqualification from the event
Unjustified or False Protest	150 Points
Changing of Batteries without Permission	Disqualification from the event

G1.1 Abusing of judges or event officials may lead to direct disqualification of the team.

G1.2 For any kind of enquiry during the event the team captain or faculty advisor will represent the team. The decision made by the organizers will be considered as the final decision.

PART H: AWARDS& PRIZE MONEY

S.NO	CATEGORY	PRIZE MONEY (INR)
01.	Champion	1,50,000+Trophy
02.	Runner Up	80,000+Trophy
03.	Second Runner Up	20,000/-
04.	Endurance B winner	25,000/-
05.	Endurance B runner-up	10,000/-
06.	Virtual Round Winner	15,000/-
07.	Best Innovation	20,000/-
08.	Best Design	10,000/-
09.	Best Auto Cross	20,000/-
10.	Best Acceleration& Braking	20,000/-
11.	Lightest Vehicle	5,000/-
12.	Best solar performance (Endurance A)	30,000/-
13.	Endurance A Runner-up	10,000/-
14.	Marketing and business plan award	10,000/-
15.	Best Industrial choice	20,000/-
16.	Best State Representative	10,000/-
17.	Best City Representative	5,000/-
18.	Team Choice Award	5,000/-
19.	Best Knowledgeable Team	5,000/-
20.	Surprise trophy	10,000/-
21.	Surprise gifts	20,000/-
	Total	5,00,000/-

G.1. The winner of event will be awarded as the Indo Asian Solar Challenge Trophy.

G.2. The industrial choice award will be given to the selected vehicle by the industrial experts.

G.3. A test will be conducted during the event and the team who got maximum marks will be selected as Best knowledgeable team of the event.

Surprise Trophy: - Will be decided during Dynamic round.

Surprise gifts: - Will be decided during Dynamic round.

PART H: CONTACT DETAILS:

Indo Asian Solar Challenge

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