



# RACE YOUR HEART OUT

**KINGS KARTING CHAMPIONSHIP**  
**18-20 DECEMBER 2018**  
**MADRAS MOTOR RACE TRACK**

Email: [kingskarting2018@gmail.com](mailto:kingskarting2018@gmail.com)

**RULE BOOK**

**CONTENTS****1. ORGANIZATION AND CHAMPIONSHIP**

- 1.1. Kings Karting Championship
- 1.2. Organizing Committee
- 1.3. Judging Criterion
- 1.4. Official Announcements

**2. KKC RULES AND ORGANIZER AUTHORITY**

- 2.1. Rules Authority
- 2.2. Rules Validity
- 2.3. Rules Compliance
- 2.4. Loopholes
- 2.5. Participating in competition
- 2.6. Right to Impound
- 2.7. Violation of intent
- 2.8. General authority

**3. ELIGIBILITY**

- 3.1. Team Requirements
- 3.2. Registration Requirements
  - 3.2.1. Team Registration
  - 3.2.2. Registration Agreement
  - 3.2.3. Registration Fee
  - 3.2.4. Mode of Payment
- 3.3. Driver's Requirements
  - 3.3.1. Age
  - 3.3.2. Driver's License
  - 3.3.3. Driver's Safety Gear
    - 3.3.3.1. Driver's Suit
    - 3.3.3.2. Underclothing
    - 3.3.3.3. Helmet
    - 3.3.3.4. Neck Support
    - 3.3.3.5. Gloves
    - 3.3.3.6. Shoes

## 3.3.3.7. Socks

## 3.4. Vehicle Requirements

- 3.4.1. Chassis Design Requirements
- 3.4.2. Chassis Material
- 3.4.3. Wheelbase and Wheel Track
- 3.4.4. Ground Clearance
- 3.4.5. Bumper (Front and Rear)
- 3.4.6. Suspension
- 3.4.7. Steering System
- 3.4.8. Braking System
- 3.4.9. Pedals and Lever
- 3.4.10. Visibility Requirement
- 3.4.11. Fuel Tank and its position
- 3.4.12. Driver Seat
- 3.4.13. Front Bodywork
- 3.4.14. Brake Light
- 3.4.15. Exhaust System
- 3.4.16. Kill Switch
- 3.4.17. Wheels and Tyres
- 3.4.18. Lock Nuts
- 3.4.19. Bolts
- 3.4.20. Fire Extinguisher
- 3.4.21. Path for Wires and Pipes
- 3.4.22. Firewall
- 3.4.23. Unstable Vehicle
- 3.4.24. Seat belt
- 3.4.25. Kart stand and Belly Pan
- 3.4.26. Final Vehicle Design

## 3.5. Vehicle Power Train

## 3.6. Vehicle Identification

**4. VIRTUAL ROUND**

- 4.1. Vehicle Design
- 4.2. Design Report
- 4.3. Cost Report
- 4.4. Design Validation Plan
- 4.5. Gantt Charts
- 4.6. Virtual round requirement

**5. FINAL ROUND**

- 5.1. Static Tests
  - 5.1.1. Design Report vs. Vehicle Analysis
  - 5.1.2. Manufacturing Level
  - 5.1.3. Discussion (Questionnaire)
  - 5.1.4. Innovation
  - 5.1.5. Technical Inspection
- 5.2. Dynamic Tests
  - 5.2.1. Brake Test
  - 5.2.2. Acceleration Test
  - 5.2.3. Skid Pad
  - 5.2.4. Autocross
- 5.3. Endurance Test

**6. PRIZES****7. RULES – CONDUCTING THE EVENT**

- 7.1. Behaviour
- 7.2. Vehicle Related
- 7.3. Penalties

**8. PROTESTS**

- 8.1. Preliminary Review – Required
- 8.2. Cause for Protest
- 8.3. Who can file the protest
- 8.4. Protest Format and Forfeit
- 8.5. Time duration to file protest

## 1. ORGANIZATION AND CHAMPIONSHIP

### 1.1. Kings Karting Championship

The event is aimed at bringing out the innovative and creative potential of young automobile enthusiasts. Diploma, Undergraduate and Postgraduate students from different technical streams such as Mechanical, Automobile, Electronics and Mechatronics can participate in the event. The basic outline of event consists of designing and fabricating a go-kart and then competing with other go-karts in the final race. All the participating teams will have no bars for creativity and innovation with few restrictions mentioned in the Rule Book. The real essence of the event lies in the sheer engineering practical application and tests in real time.

The students must function as a team to design, innovate, build, test, promote and compete with the vehicle within the limits of the rulebook. The vehicle and associated documentation must be researched, designed and fabricated by the team members without direct/indirect involvement of professionals and faculty (**However can be used for guidance, but should not be involved in other activities**). Proof of manufacturing (photograph/video) can be asked to present at any point of time during the event. The decision of the KKC organizing committee in every regards will be final. Team can also generate financial support for their project from companies and other organizations.

### 1.2. KKC Organizing Committee

The KKC organizing committee provides a platform to young students to showcase their talent at a grandeur stage. Racing is not just about speed but more about how you survive breakdowns, how durable your vehicle is, what the science behind it is. The best way to do so is by competing with the best. KKC organizes a special competition especially for students, where you can learn and earn while having fun. Now it is the time to challenge your potential and experience the thrill by competing with the best minds of the nation.

Design, innovate, learn and get ready to pull the throttle and win accolades across the Nation.

### 1.3 Judging Criterion

The Karts are judged in a series of static and dynamic events including technical inspection, cost presentation, engineering design and in order to qualify and compete in the high-performance track endurance.

The dynamic events are scored to determine how well a Kart performs, however individual awards will be awarded for every teams which make achievements in respective categories.

**Note: The award categories are provided further below**

The following points are possible:

**STATIC EVENTS**

<b>Technical Inspection</b>	<b>200</b>
<b>Innovation/ Creativity</b>	<b>100</b>
<b>Design Presentation (Virtual)</b>	<b>250</b>
<b>Business Plan Presentation</b>	<b>100</b>
<b>Braking test</b>	<b>100</b>
<b>Skid Pad</b>	<b>150</b>
<b>Autocross</b>	<b>150</b>
<b>Acceleration</b>	<b>100</b>
<b>Rain test</b>	<b>50</b>
<b>Endurance</b>	<b>400</b>

---

**Total** **1600**

The entire official announcement regarding the Kings Karting championship will be published on-

**<http://www.kingsengineeringcollege.in/events1.html>**

**<https://www.facebook.com/Kings Karting Championship>**

## 2. KKC RULES AND ORGANIZING AUTHORITY

### 2.1. Rules Authority

There are several rules, regulations and restrictions which are to be followed by all participating teams. KKC Organizing Committee is having right to impound each and every rule associated with the event. Violation by anyone of the participating member or team may be liable to be penalized severely, inclusive of and up to debarring of the team from the competition at any stage or withdrawal of award/awards, as well. Ambiguities or questions concerning the meaning or intend of these rules will be resolved by KKC organizing committee during competition onsite. The rules and regulations will also be explained in the workshop.

### 2.2. Rules Validity

The rules will be same throughout the event. However, amendments (if any) will be made known to all the participating teams.

### 2.3. Rules Compliance

By registering for this event, the team members, faculty advisors and other personnel of the college/university agree to comply with and will be bounded by these rules or procedures issued or announced by **KINGS KARTING CHAMPIONSHIP 2018 (Season-1)**. All the team members, faculty advisors and other university representatives are required to cooperate with the competition organizer, officials and judges in all the penalties, results and intrusions in KKC.

### 2.4. Loopholes

It is virtually impossible for a set of rules to be so comprehensive that it covers all possible questions about the vehicle's design parameters or the conduct of the competition. Please keep in mind that the safety remains of paramount importance during KKC. Any perceived loopholes should be resolved in the direction of increased safety/concept of the competition.

### 2.5. Participating in the competition

Teams, team members, faculty advisors and other representatives of a registered college/university who are present on-site at the competition are considered to be "participating in the competition" from the time they arrive at the event site until they depart the site at the conclusion of the competition or any act which shows their non-participation or earlier by withdrawing.

Team documents should be submitted in given date

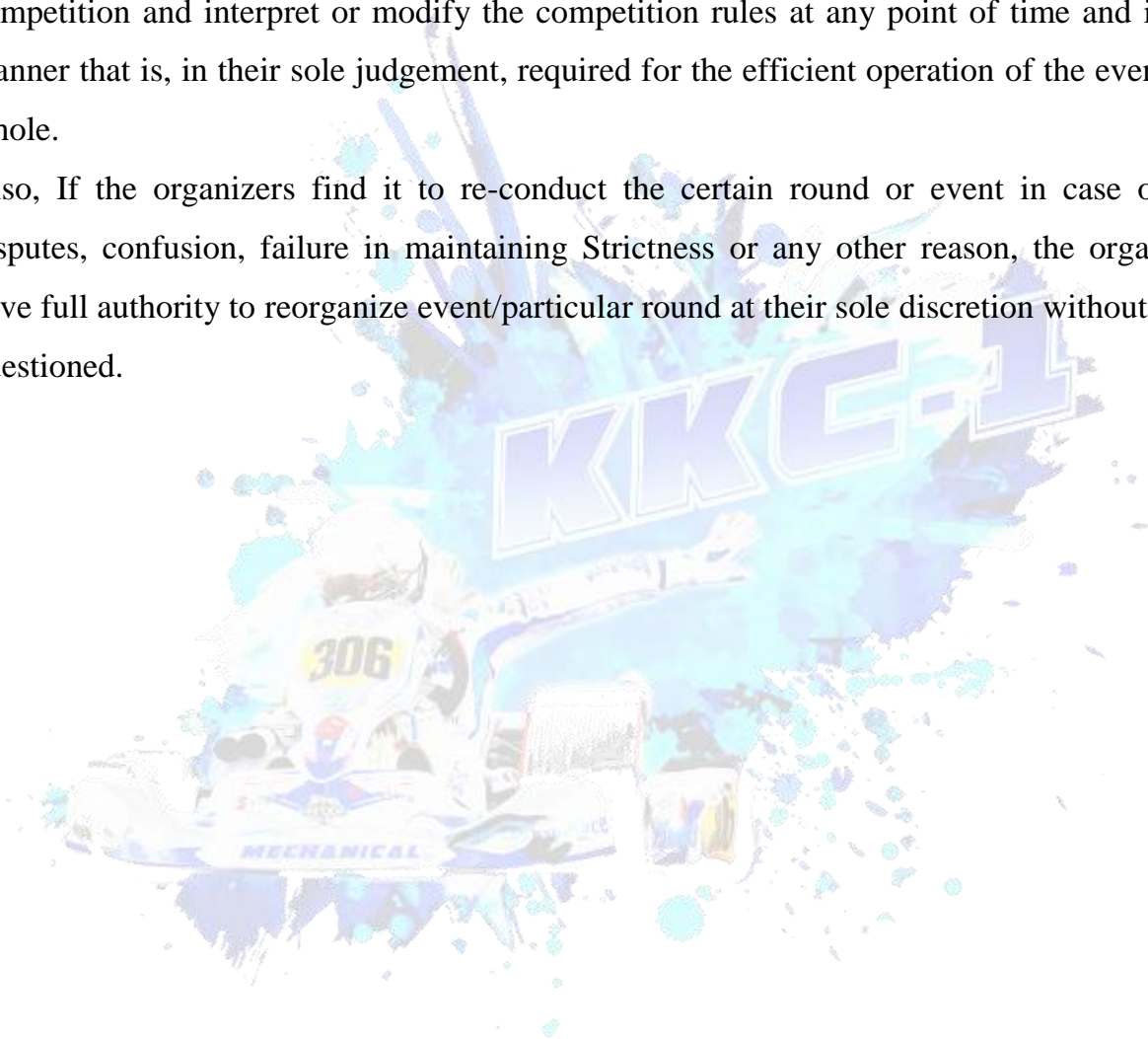
Teams which do not appear for –

1. One day workshop (About the event)
2. Virtual round
3. Onsite Technical Inspection and Dynamic round even on proper eligibility within stipulated time shall not be eligible to appear in the endurance level.

### **2.6. General authority**

KKC organizing committee reserves the sole rights to revise the schedule or venue of the competition and interpret or modify the competition rules at any point of time and in any manner that is, in their sole judgement, required for the efficient operation of the event as a whole.

Also, If the organizers find it to re-conduct the certain round or event in case of any disputes, confusion, failure in maintaining Strictness or any other reason, the organizers have full authority to reorganize event/particular round at their sole discretion without being questioned.





### 3. ELIGIBILITY

#### 3.1. Team Requirement

The team registering for **Kings Karting Championship** must have a Team Name, Team Logo, Team Captain and the Faculty Facilitator. Any number of teams can register from One College and in case of multiple registrations from a single College, the Team Name, Team Logo and Team Captain must be different but the Faculty Advisor can be same. And a team must comprise of members from same college. There can be more than **20members** in a team. It is to be noted that an additional fee of **Rs.1000** will be collected for each additional member.

#### Eligibility criteria

Eligibility is limited to students from engineering degree/diploma to ensure that this event is an engineering competition rather than a race, our sole motive remains the honing up of engineers and encouraging better engineering practices. Individual members of a team participating in this competition must satisfy the following requirements.

Team members must be enrolled as degree seeking undergraduate student in a college or university. All those team members who have registered while still being enrolled in a UG course are eligible to participate in the competition (**Team members who have graduated before the year 2018 or in 2018 are not eligible to participate.**)

#### Faculty Advisor Requirements

Each team is expected to have a Faculty Advisor appointed by the institution. The faculty advisor is expected to work as a team adviser and is not allowed to interfere during static and dynamic events. Faculty advisors should not get involved directly or indirectly in design, build or repair any part of the vehicle & ensures it is done by participating students only.

#### 3.2. Registration Requirements

##### 3.2.1. Team Registration

Online registration will be open 24x7 on our website [www.kingsengineeringcollege.in](http://www.kingsengineeringcollege.in) from July-2018. Once the team has been registered online, the payment must be done within closing date of the registration [In case of payment failure within the due dates, online registration will be cancelled].

### 3.2.2. Registration Agreement

By registering in **KKC** the Team Captain, Team Member, Faculty Advisor, College Management must agree with the rules and regulations. They understand that all the information provided in the registration documents and online registration forms are correct to the best of their knowledge. Also, they accept that team would undertake all the activities without the help of a professional directly or indirectly. In case of violation of rules and regulations specified in this Rule Book, the team is liable for disciplinary actions as per the decision of the Management. **The amount deposited by teams is non-refundable.**

### 3.2.3. Registration Fee

Registration fees of **Rs. 25000/-** per team (All inclusive, upto 20 members) non-refundable or adjustable in any circumstances.

**For extra member, Rs. 1000 per member** (the team size cannot be more than 25 in any case) and the option for adding the extra members more than 20 will be available during the registration phase.

### 3.2.4. Mode of Payment

The registration money can be paid through the following:

- Money transfer through NEFT/IMPS. **(Details are given below)**

<b>Account name</b>	<b>KINGS ENGINEERING COLLEGE</b>
<b>Bank</b>	<b>AXIS BANK LTD</b>
<b>Branch</b>	<b>IRUNGATTUKOTTAI</b>
<b>IFSC Code</b>	<b>UTIB0000843</b>
<b>Account no</b>	<b>909010033758867</b>

### Details regarding Login ID and procedure-

Organisers will provide team Login ID to all the teams on the website ([www.kingsedu.ac.in](http://www.kingsedu.ac.in)) and all the relevant information/announcements will be displayed in the respective team Login ID. In the team accounts, teams will be able to do online payment, download and upload payment proof, reports etc.

### **3.3. Driver's Requirements**

#### **3.3.1. Age**

Every Team is supposed to have two drivers and both the drivers of the team must be at least 18 years of age.

#### **3.3.2. Driver's License**

Each driver must have a valid Driver's License (Four-Wheeler) issued by the Government of India (Learner's License not allowed). Both drivers must provide a license copy when insisted by Technical Committee.

#### **3.3.3. Driver's Safety Gear**

The following are the minimum requirements and restrictions that will be enforced through technical inspection; at any stage committee members must be corrected. Vehicles without passing the technical requirements of competition, Noncompliance if any observed by the inspection/organizing/judging inspection would not be allowed to participate further in the event. All the parts of Driver's Safety Gear must meet the required rating (specified). No driver would be allowed to drive the vehicle without the complete driver's safety gear in any of the dynamic event. All the safety gears shall have manufacturers labelled attached with a month & year of manufacturing, which is mandatory. Without label and invoice, teams will not be allowed to participate.

The complete driver's gear of KKC will consist of the following items:

##### **3.3.3.1. Driver's Suit**

A fire-resistant one-piece suit, made from a minimum of 1-layer that covers the body from the neck down to the ankles and the wrists. The suit must be certified to either one of the following standards and be labelled as such:

SFI 3-2A/1 (or higher)

FIA Standard 1986

##### **3.3.3.2. Underclothing**

It is strongly recommended that all drivers wear fire resistant underclothing (long pants and long sleeve t-shirt) under their approved driving suit. This fire-resistant underclothing should be made from an acceptable fire-resistant material and should cover the driver's body completely from neck down to ankles and also the wrists.

**Note:** If you do not wear fire resistant underclothing, it is strongly recommended that you should wear cotton underclothing (t-shirt and long underpants) under your approved driving suit.

### 3.3.3.3. Helmet

A well-fitting closed face helmet that meets one of the following certifications and is labelled as such

- Snell K2000, K2005, K2010, M2000, M2005, M2010, SA2000, SA2005, SA2010
- SFI 31.2A, SFI 31.1/2005
- FIA 8860-2004, FIA 8860-2010
- ISI/BIS rated

Open-faced helmets are not allowed. All helmets to be used in the competition must be presented during Technical Inspection where approved helmets will be stickered. The organizer reserves the right to impound all non approved helmets until the end of the competition.

### 3.3.3.4. Neck Support

The use of neck support is mandatory. The neck support must be in full circle (360°) and SFI rated. Horseshoe collars are not allowed.

### 3.3.3.5. Gloves

Leather gloves with extra foam are acceptable.

### 3.3.3.6. Shoes

Fire resistant shoes made from acceptable fire-resistant material, shoes must be certified to the standard and labelled as such.

SFI 3.3 or higher

FIA 8856-2000

**Note:** Sport shoes / Canvas shoes / Leather shoes / Industrial safety shoes are not allowed at any point of the event.

### 3.3.3.7. Socks

Fire resistant socks made from acceptable fire-resistant material or cotton socks that covers the exposed skin between the driver's suit and the boots/shoes.

## 3.4. Vehicle Requirements-

### 3.4.1. Chassis Design Requirements

The vehicle must necessarily have four (4) wheels not in a straight line. The vehicle must have a wheelbase within the range of 1006mm to 1430mm. The wheelbase is measured from the centre of contact on ground of the front to rear tires with the wheels pointed straight ahead. The mountings and designing of chassis should be such that there should be minimum 2 inches (gap) clearances between the driver and any component of the vehicle in static and dynamic condition – hands, torso, thigh etc. Body parts making contact with the parts at normal seating position are excluded from the rule. The overall length must be less than 1900mm and overall width must be less than 1500mm. The maximum height should be 950 mm from the ground. Holes in chassis are not permitted. Any violation in the above-mentioned dimensions will be given penalty.

### 3.4.2. Chassis Material

The tube/rectangular pipe used in the fabrication of the chassis or the other frames/supports may be seam or seamless. Size must be at least 1 inch (25.4 mm), (for pipe it will be OD and for rectangular section or square section, it will be its minimum height). Chassis material must have minimum wall thickness of 1.5 mm. **Material certification is essentially required to be produced during the document submission.** Material should be certified from any of the material testing laboratories for its chemical and mechanical properties, the same report should be presented at the time of inspection and throughout the event.

### 3.4.3. Wheelbase and Wheel Track

The wheelbase of the vehicle must be within 1006mm to 1430mm and the smaller wheel track (front or rear) must be no less than 70% of the wheelbase of the vehicle.

### 3.4.4. Ground Clearance

With the driver aboard there must be a minimum of 25.4 mm (1 inch) and maximum 76.2 mm (3 inch) of static ground clearance measured from the lowest point (except tyres) of the

vehicle, under the complete vehicle. No compensation (like chain sprocket, brake disc will be included while measuring ground clearance).

#### **3.4.5. Bumper (Front, Rear and Side)**

Bumpers must be installed in the front, rear and side of the vehicle such that they cover the vehicle and protect them from any collision which may occur on the track. They must be made of steel tubes. Minimum OD 1 inch (25.4 mm) and minimum wall thickness 1.65mm, Vehicles must have proper accessibility for towing or harness can be used for towing purpose.

#### **3.4.6. Suspension**

No Suspension allowed.

#### **3.4.7. Steering System**

The steering system must be able to control (simultaneously) front two (2) wheels. The steering system must have positive steering stops that prevent the steering linkages from locking up either in RH or LH turning (the inversion of a four-bar linkage at one of the pivots). The stops may be placed on the spindles or chassis or on the rack and must prevent the tires from contacting body or frame members during the dynamic events. Allowable total steering system free play (inclusive of play in all the steering linkages) is limited to 7 degrees, measured at the steering wheel. The steering wheel must be mechanically connected to the front wheels, i.e. steer- by-wire or electronic steering is prohibited. Turning radius should not exceed 2.5m.

#### **3.4.8. Braking System**

The braking system installed must be capable of stopping the vehicle in a straight line without losing control during the brake test. The vehicle must have hydraulic braking system and the pedal must directly actuate the master cylinder through a rigid link (i.e., cables are not allowed). All brake lines must be securely mounted and not fall below any portion of the vehicle. Electronic braking systems are strictly prohibited. In case of any wheel via disc brake mechanism bleeding ports for disc calliper should be upside to that of piston mechanism of calliper. There should be no leakage from the tandem master cylinder (TMC) or reservoir.

### **3.4.9. Pedals and Lever**

In any case, pedals must never protrude forward of the chassis including bumpers. Pedal footrest must be provided. Pedals should not tend to bend on the application of force during dynamic events. Pedal size should be according to the driver's foot. Karts with manual transmission system are allowed to use gear lever system of either mechanical linkage or wire cable type. Movement of gear lever links or wire cable must not be restricted by any other component and should maintain a significant clearance with every component nearby.

### **3.4.10. Visibility Requirement**

The engine compartment must be completely visible to examiners.

### **3.4.11. Fuel Tank and its position**

The capacity of the fuel tank can be up to 8 litres in volume. The placement of fuel tank should be such that it maintains a proper distance from the engine and also it should not be above the battery. It must be securely fixed to the chassis and be designed in such a way that neither it nor the fuel pipes (which must be flexible) present any danger of leakage during the event. A quick attachment to the chassis is strongly recommended. The tank shall in no way be shaped to act as an aerodynamic device. The fuel feed system to the engine must be the same as provided by the manufacturer of that engine. There must be a fuel volume indicator to display the volume of fuel inside the tank.

### **3.4.12. Driver Seat**

The seat mounting must be rigid enough to withstand the various forces that the vehicle will undergo while the go-kart is being driven on the track. The driver seat should be at least 2 inches away from the firewall's each and every corner. The Driver's seat must be designed in such a way that it prevents lateral motion of the driver when multidirectional forces act on him when cornering or braking. The seat must not protrude below the lowest plane of the chassis frame, under any condition what-so-ever. Only go-kart bucket seat is acceptable. Seats used from chairs or stools or seats having height from floor pan are strictly prohibited.

### **3.4.13. Front Bodywork**

The bodywork of the front part must be designed such that the vehicle number and the team logo must be displayed clearly. Front body work must be provided such that the driver egress in less than 5 seconds.

#### 3.4.14. Brake Light

The vehicle must be installed with a brake light red in colour which must be clearly visible from the rear. If an LED brake light is used, it must be clearly visible in very bright sunlight. This light must be mounted between the wheel centreline. All the electrical connections done must be well insulated and should be tied properly.

#### 3.4.15. Exhaust System

The exhaust system should be so chosen such that it reduces down the emission of harmful gases from the exhaust. Use of suitable catalytic converter and the mufflers is recommended. The exhaust system must be properly shielded preventing the delicate parts which may get affected if exposed to the heat. The exhaust must be mounted properly to avoid the physical contacts of the viewers or the technical inspectors. The direction of the flue gases from the exhaust pipe must be **directed towards the ground**. Shielding to exhaust pipe with cotton rope, jute rope is strictly prohibited. Team can use metallic porous sheet to cover the exhaust pipes. The shielding of exhaust must be such that it does not cause hindrance in the

Heat dissipation of exhaust pipe and also shielding guard should not have any direct contact with the exhaust.

#### 3.4.16. Kill Switch

The electrical system must include at least two kill switches. The kill switches must deactivate the engine ignition. The kill switches must NOT deactivate the brake light. Kill switch must kill the engine on pressing only, not on pulling.

Kill switches locations-

- (A) **Cockpit Switch** – The cockpit switch must be located in the front of the cockpit within easy reach of the driver. The switch must not be mounted on a removable steering wheel assembly (if any).
- (B) **External Switch** – The external switch must be mounted on the driver's right side of the vehicle. The switch must be within easy reach of track marshals. The switch must be mounted rigidly, with no sharp edges nearby.



### 3.4.17 Wheel and Tyres

Teams must use standard Go-kart Tyres. Acceptable tyre size for front is 10x4.5-5 (all dimensions are in inches) and for rear tyre is 11x7.1-5 (All the dimensions are in inch).

### 3.4.18. Lock Nuts

Locking nuts are mandatory to be used everywhere in the vehicle. Failure to fulfill this, no team will get "T.I. OK" for the vehicle.

### 3.4.19. Bolts

All bolts used in the system must meet metric grade M8.8, No fasteners used should be less than 8.8 . Thread lockers spring washers are prohibited. All fasteners used should have minimum two (2) threads showing past the nut.

### 3.4.20. Fire Extinguisher

Each team must have at least two (2) nos. of 1 kg ABC type fire extinguishers. Fire extinguisher should be in proper working condition. It should be accompanied with a sticker or a bill clearly mentioning its expiry date.

- One of the fire extinguishers must be available in the kart within the driver's reach
- One with a team representative accompanying the kart throughout the event.

### 3.4.21. Path for Wires and Pipes

No pipelines/wire connections must go under the chassis. It is strictly prohibited. Doing so, may lead to heavy penalty.

### 3.4.22. Firewall

Firewall is a boundary which protects the driver from the heat produced by the engine. So, the firewall must be made up of a suitable material which can solve the purpose. It should be made in such a manner that driver's body parts are not affected by the engine heat at any time during the dynamic/static condition. There should be minimum **3 inches clearance** between the firewall and the engine cylinder block and minimum **1 inch's clearance** between the firewall and other parts of engine. There should not be any part of chassis member or any mounting in the one-inch clearance between the firewall and engine.

**3.4.23. Unstable Vehicle**

Any vehicle exhibiting handling issues or other vehicle dynamics that are deemed unstable by the technical inspectors will not be permitted to participate in the dynamic events. The decision of the Head of the Technical Committee of KKC in this regard will be final and binding to all. This is in the interest of safety of all teams.

**3.4.24. Seat Belt**

Seat belts are not permitted in the kart.

**3.4.25. Kart Stand**

The kart, at all times, must be accompanied by a self-fabricated or pre-fabricated movable and foldable kart stand. No independent motion of the Go-kart will be allowed in any circumstances apart from the actual final day race. The stand is expected to be at least 35 inches tall. Take special care for the stability of the stand and portable motion restrictors to ensure maximum usability. It can be painted with any colour. Teams are free to select or design their own kart stand. Teams can use prefabricated stands also.

**3.4.25.1. Floor tray/Belly pan**

The cockpit must be fitted with a belly pan over the entire length of the cockpit, so that the driver cannot contact the ground and is protected from debris while seated normally. Belly pan material must be metal, fibreglass, plastic, or similar material. They must be designed to prevent debris and foreign object intrusion into the driver compartment. Expanded metal, fabric, or perforated panels are not allowed.

**3.4.26. Final Vehicle Design**

The design report must contain a valid and complete design of the vehicle including all Subsystems.

### 3.5. Vehicle Power Train-

**Teams are free to select any engine meeting following requirements-**

Engine Type -	Single Cylinder, Four Stroke Gasoline Engine
Cooling System -	Air /water/oil Cooled
Maximum Capacity -	130cc
Type of Transmission -	Manual gearbox / CVT / Centrifugal Clutch type

#### 3.5.1. Engine Tuning

Teams have full flexibility to tune the engine, but there are few restrictions, which a team must not do at all, during the whole event-

- Increase engine capacity.
- Temper the Rated RPM of engine.
- Modify the internal of combustion cylinder or piston.
- Using Energy boosting devices/hybrid systems are strictly prohibited.
- Teams can design their vehicle at any maximum speed. This can be done by selecting an appropriate final drive reduction.

Under any circumstances, if any team is found tempering with the engine (with reference to the above points) shall be subjected to immediate disqualification from the competition. The jurisdiction lies in the hands of the KKC authorities.

Original bills or the original vehicle registration papers (if vehicle belongs to a team member) or an attested No Objection Certificate (NOC) from the owner with the original Registration Papers is to be presented during Technical Inspection. Failure to present the same will directly lead to penalty.

#### 3.5.2. Starting System

Every kart must be either electric start or recoil or pull start. Karts must be equipped with an on-board starter switch which must be used to start the engine at all times by the driver itself. Kick-start is prohibited.

**Note-** Positive locks and recoil spring must be provided with the throttle pedal.

At the end of race, engine of suspected karts may be inspected. However, if any team alters the capacity of cylinder will be disqualified from the event.

### 3.5.3. Power Train Guards

All rotating parts such as belts, chains, and sprockets that rotate at the rate of the drive axle(s) or faster, must be shielded to prevent injury to the driver or bystanders if the component fly apart due to centrifugal force. These guards/shields must extend around the periphery of the belt or chain and must be wider than the rotating part they are protecting. They must be mounted with sound engineering practice, in order to resist vibration. Rotating parts must also be guarded all around, in addition to the guard around the periphery. All around guarding (finger guards) must prevent small, searching fingers from getting caught in any rotating part.

A complete cover around the engine and drive-train is an acceptable shield.

**There must not be any sharp edges on the complete vehicle.**

### 3.5.4. Engine Registration

During the technical inspection, all the teams will need to register their engines with KKC. For this the teams will have to present their bills and papers of the engine on which the model, make and type are clearly mentioned. Teams are advised to purchase the engine from a trusted dealer only; no engines should be associations in illegal issues, it may directly result into disqualification of the team from the event.

### 3.6. Vehicle Identification-

Each team will be given a vehicle number. The vehicle will be known by this number in the entire event. Teams are required to have a team name with an impressive team logo along with the college logo, which is to be placed on the vehicle's body with KKC logo.

Teams are advised not to place any logos on the front nose of the vehicle because the vehicle number will be placed on the front of the vehicle. The kart number must be clearly visible from all sides, front and rear of the vehicle. It is mandatory to stick kart number in black font colour and in yellow background only. **The height of the numbers must be at least 152.4 mm (6 in). And must have a minimum line width of 15mm (0.6 in) and 76.2 mm (3 in) wide.**

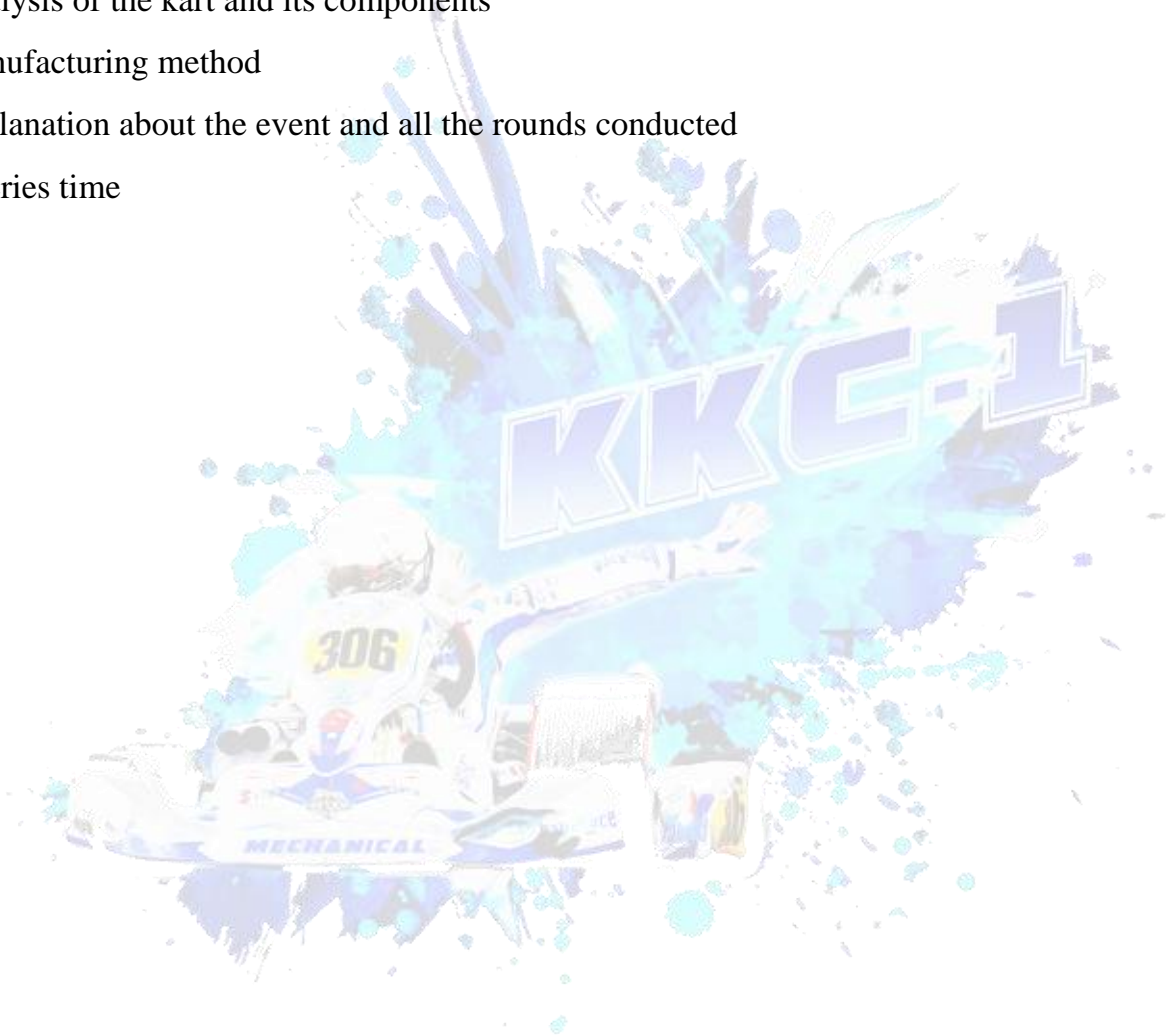
### 3.7. One day Workshop

This workshop will be conducted for the benefit of the team members so that they will have a complete view about the KKC Event. The workshop is mandatory in order to participate in KKC event. 3 members per Team (Captain and two drivers) must attend the workshop. The workshop will be conducted for a day with two sessions: F.N session and A.N session.

Venue: **KINGS ENGINEERING COLLEGE.**

The features which will be explained in the workshop are:

- Design of the kart
- Analysis of the kart and its components
- Manufacturing method
- Explanation about the event and all the rounds conducted
- Queries time



## 4. VIRTUAL ROUND

In the Virtual Round, all the teams are required to showcase their research and development in a power point presentation. The prime objective is to design the complete CAD Model of the Go-kart. The design should be complete in all respects to the extent of being considered ready to manufacture. The teams will be evaluated based on their knowledge of the basic automotive design technology and about the Go-Kart design and manufacturing requirements.

The team must be ready with the following requirement while appearing for the virtual round.

### 4.1. Vehicle Design

Different views of completely assembled design of the vehicle must be presented in this report.

- 1) Preliminary Technical Specifications & Overall Performance Targets. 2D / 3D views of the proposed Go-Kart design.
- 2) Design Methodology for Roll Cage, Main dimensions/structural and material of roll cage.
- 3) Proposed Engineering process for FEA – load cases and constraints, meshing size, solver used, criteria for Factor of Safety & deformations. (Impact analysis - Front, rear, side and torsion are compulsory)
- 4) Ergonomics knowledge related to vehicle cock pit lay out – Driver seating lay out, ease of egress, vision, reach, controls and safety considerations.
- 5) Steering - Design Methodology & considerations for selection of steering system, turning radius, Steering ratio, Turns lock to lock, Steering angles - Inside and outside, Steering wheel diameter, Steering wheel torque etc.
- 6) Brakes - Design Methodology & considerations for brakes, type selection (Disc / drum brakes), brake circuit lay out/actuation, Stopping distance, deceleration, pedal effort etc.

### 4.2. Design Report-

The design report must contain all the necessary details related to the vehicle like analysis, calculations, etc. It is recommended to provide at least three different views of vehicle drawing with proper dimensions.

- 1) Power train (Engine to wheel including tires) & mounting / packaging considerations,
- 2) Transmission Unit-Geared / CVT / Centrifugal clutch / any other, Vehicle performance prediction e.g. minimum torque required, Vehicle speed, Acceleration etc.
- 3) Manufacturing processes required for various important vehicle aggregates, machine tools/hand tools and other facilities required.

#### **4.3. Cost Report-**

The cost report must include all the calculations and cost of the parts procured and also its machining cost as per market rates. No need of accounting vat and other taxes in the cost report. Cost without vat is expected in the report.

- 1) Technical parts list for the vehicle (BoM): Overall weight and cost elements/ estimates and financing for the project.

#### **4.4. Business Plan**

Business plan is a formal presentation where the team members are required to describe the ways in which the team can sell the kart in the trending market. The innovations added by the team members can be included in the business plan presentation. The business plan presentation is asked to submit so that the marketing skills of the emerging engineers can be tested at a very earlier stage.

#### **4.5. Gantt Charts**

Gantt charts illustrate the start and finish dates of the terminal elements and summary elements of a project. Terminal elements and summary elements comprise the work breakdown structure of the project. This chart is basically the management of the project and distribution of different tasks in the team members with completion deadlines. The Gantt Chart must be attached along with the design report.

- Team size, Responsibilities assigned (team structure), Project Plan – including Validation test schedule (Gantt chart).

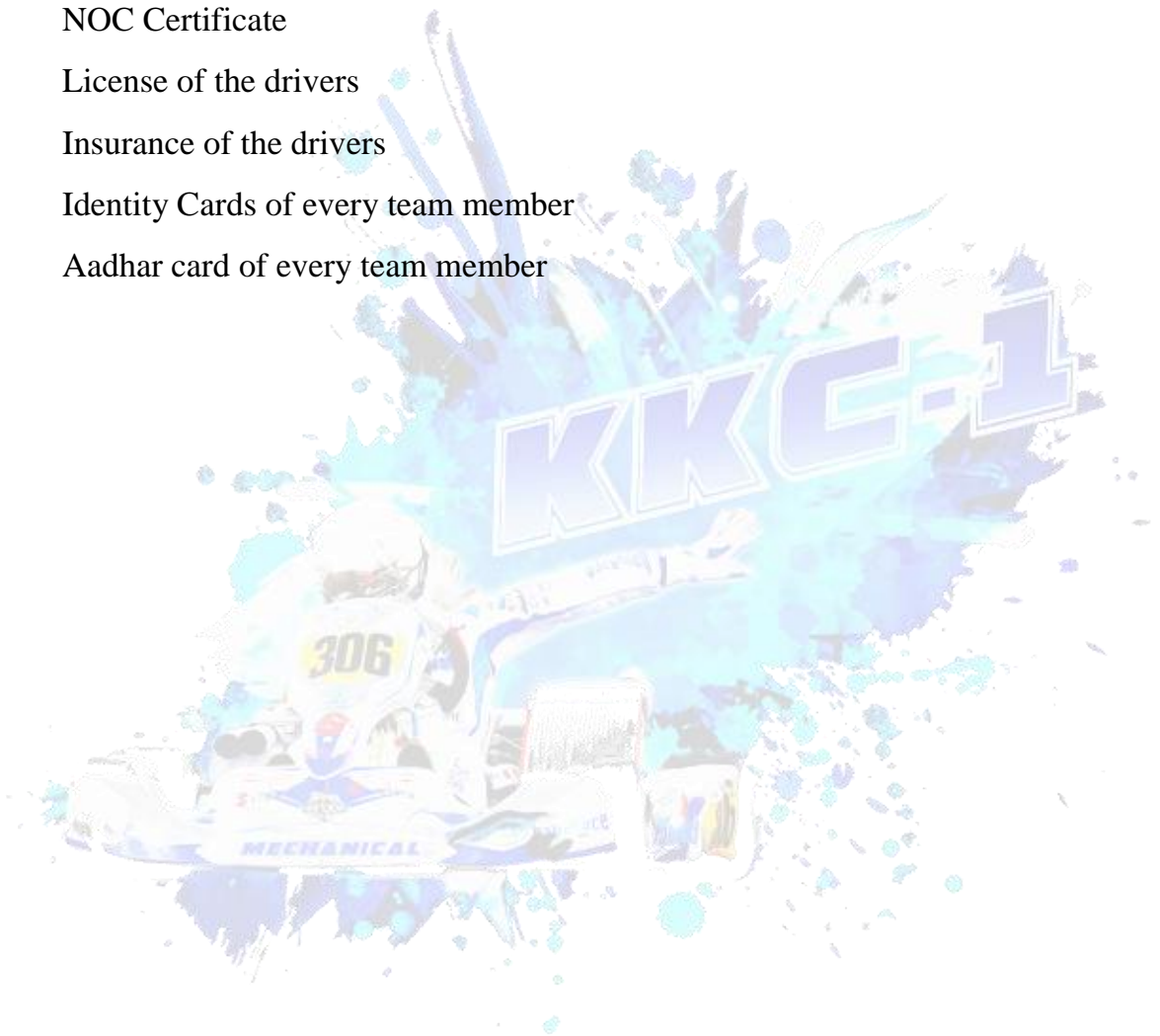
#### **4.6. DFMEA**

It is the application of the failure mode and effective analysis method especially for kart design. It is a methodical approach used for identifying potential risks introduced in a design of kart. The risk priority number must be mentioned clearly indicating the causes of failure.

#### 4.7. Document Submission

The documents which every team has prepared are to be submitted during the KKC Event. The documents which need to be submitted are:

- Design Report
- Business Plan
- Cost Estimation
- Form 20
- NOC Certificate
- License of the drivers
- Insurance of the drivers
- Identity Cards of every team member
- Aadhar card of every team member





## 5. FINAL ROUND

### 5.1. Static Tests

#### 5.1.1. Technical Inspection

Before the dynamic event there will be TI (technical inspection) where the teams will be asked to submit their design report and the examiners will compare it against the vehicle manufactured. TI will be based on rulebook parameter and safety checks of the vehicle. The team will be allowed only 2 chances for the TI test.

The weight of the Kart will also be checked during this round. The kart having the least weight will be awarded.

**NOTE:** If the vehicle passes the Technical Inspection round in the first chance itself, Full marks will be awarded to the teams. But if the team passes the Technical Inspection during the second chance, only 50% of the allocated marks will be awarded with respect to the particular categories in which they have failed.

The important aspects that will be verified during the technical inspection round are;

- **Design Report vs. Vehicle Analysis-** The vehicle will be verified with the final design report. Deviating up to 10% from the final design report is acceptable but on further deviations, teams will be given penalty accordingly.
- **Discussion (Questionnaire)-** In the static test event while examining the vehicle, judges may throw questions on any of the team members. The team members are advised to be prepared with the vehicle. Each team is required to have a hard copy of the vehicle documents.
- **Innovation-** The innovation done in the vehicle in Virtual Round will be discussed with the team and its working will be examined by the technical inspectors in the respective paddock of the teams. Team needs to present innovation report at the time of explaining the innovation. The innovation should be working and not just the concept.

### 5.2.1. Rain Test-

The vehicle will undergo a shower for some time till it is fully wet. The driver will be asked to start the engine after this. If the engine starts and the brake light works even after the shower, full points will be awarded.

## 5.2. DYNAMIC TESTS

### 5.2.1. Brake Test

It's mandatory for a vehicle to pass the brake test to participate in any of the dynamic events. The vehicle must stop in a straight line after the brake is applied on the vehicle. Each vehicle will be given 2 attempts to clear the brake test. The vehicle is made to run with full acceleration (ensured by the KKC representative) for 30m and the brake must be applied at the end of 30m. Distance of braking will be measured. Shortest braking distance will be awarded the best braking category. The best score of the two attempts will be considered.

At the finish line the karts are expected to apply full brakes and the brakes must lock. After locking, rolling of tires (where the brakes are applied) will not be allowed in any circumstances. Skidding of the tires is allowed provided that the vehicle does not deviate more than 30° from the initial course of motion otherwise the attempt will be nullified.

### 5.2.2. Acceleration Test

Acceleration determines the time taken by the vehicle to accelerate along 30m flat course.

Each team may make two (2) attempts with or without different drivers. Scoring will be based on the better of the two attempts.

### 5.2.3. Auto Cross Test

The objective of the Auto-Cross event is to measure the Kart cornering ability on a flat surface while making a constant-radius turn.

### **Auto-Cross Layout**

There will be two (2) pairs of concentric circles in a figure of eight pattern. The centres of these circles will be 7.5m apart. The inner circles will be 4 m in diameter, and the outer circles will be 9 m in diameter. The driving path will be the 2.5 m path between the inner and outer circles. The vehicles will enter and exit through gates on a 2.5 m wide path that is tangential to the circles where they meet.

### **Procedure**

The vehicles will enter in to the figure eight and will have to take two full lap of the figure of eight track.

### **5.2.4. Skid Pad Test**

The objective of the skid pad event is to evaluate the vehicle's manoeuvrability and handling qualities on a tight course without the hindrance of competing vehicles. The skid pad course will combine the performance features of acceleration, braking, and cornering into one event.

### **Procedure**

The vehicle will be made to perform in Skid pad where in 5 cones will be placed at a distance of 3m between the cones. The vehicles must pass between the cones in a zigzag manner and must reach the finish point. The time will be calculated. The vehicle finishing in shortest time with less penalty will be awarded the best skid pad award.

### **Penalties**

- Cones down Or Out- A penalty of several seconds will be added to the time for every cone that is knocked- down or out (including gate cones).
- Incorrect laps- Vehicles that do not follow procedure, i.e. run an incorrect number of laps or run the laps in the wrong sequence, several seconds will be added as penalty.

### **5.2.5. Endurance Test**

The following are general guidelines for conducting the endurance event. The organizers reserve the right to establish procedures specific to the conduct of the event at the site.

**No refuelling will be allowed during an endurance test.**

**Procedure**

During the final event, all the vehicles will be allowed to participate in the round 1. During the round 1 all the teams will be segregated into batches. Top 3 vehicles from every batch will be allowed to compete for the best racer award.

In the final round, the best vehicle from every batch will be allowed to race against each other.

**NOTE: The allotment of the batch will be decided by the organising committee through lots. The segregation of batches will depend upon the number of teams registered and the decision of the organising committee. The decision taken by the organising committee will be considered to be the final vote.**

**Endurance Fuel Fill**

Before entering the event, each vehicle's fuel tank must be filled. Vehicles appearing for the final round can refill their fuel tank before lining up for the round.

**(Fuel will not be provided)**

**Vehicle Breakdown and Stalls**

If a vehicle breaks down it will be removed from the course and will not be allowed to re-enter the course. If a vehicle stalls, it will be allowed to restart and re-enter the course where it went off, but no work may be performed on the vehicle. If a kart stalls and cannot be restarted without external assistance, the track marshals will push the car clear of the track. At the discretion of event officials, two (2) team members may retrieve the car under direction of the track marshals.

**Penalties-**

- Failure to obey a flag:** 10 sec
- Vehicle to Vehicle contact:** DISQUALIFIED (who hit the other kart)

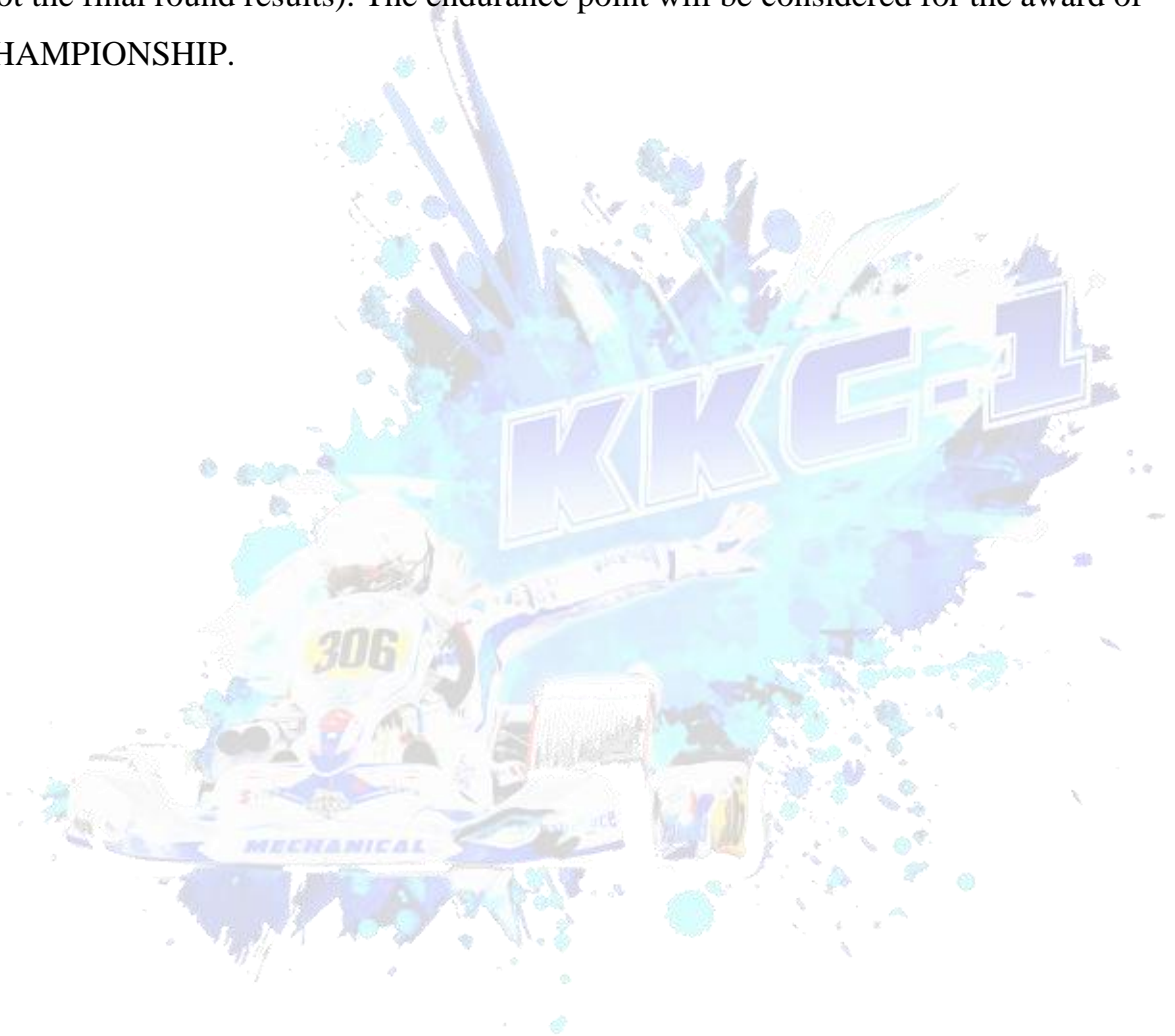
**Note: In case a kart hits another kart, the victim may be given another chance within the terms and conditions.**

•**Mechanical Problem-** No additional penalty other than the time lost to ensure that the car is safe to continue.

•**Reckless or Aggressive Driving-** Any reckless or aggressive driving behaviour (such as forcing another car off the track, refusal to allow passing, or close driving that would cause the likelihood of car contact) will be warned. If the same behaviour continues then a penalty of 15 sec will be given.

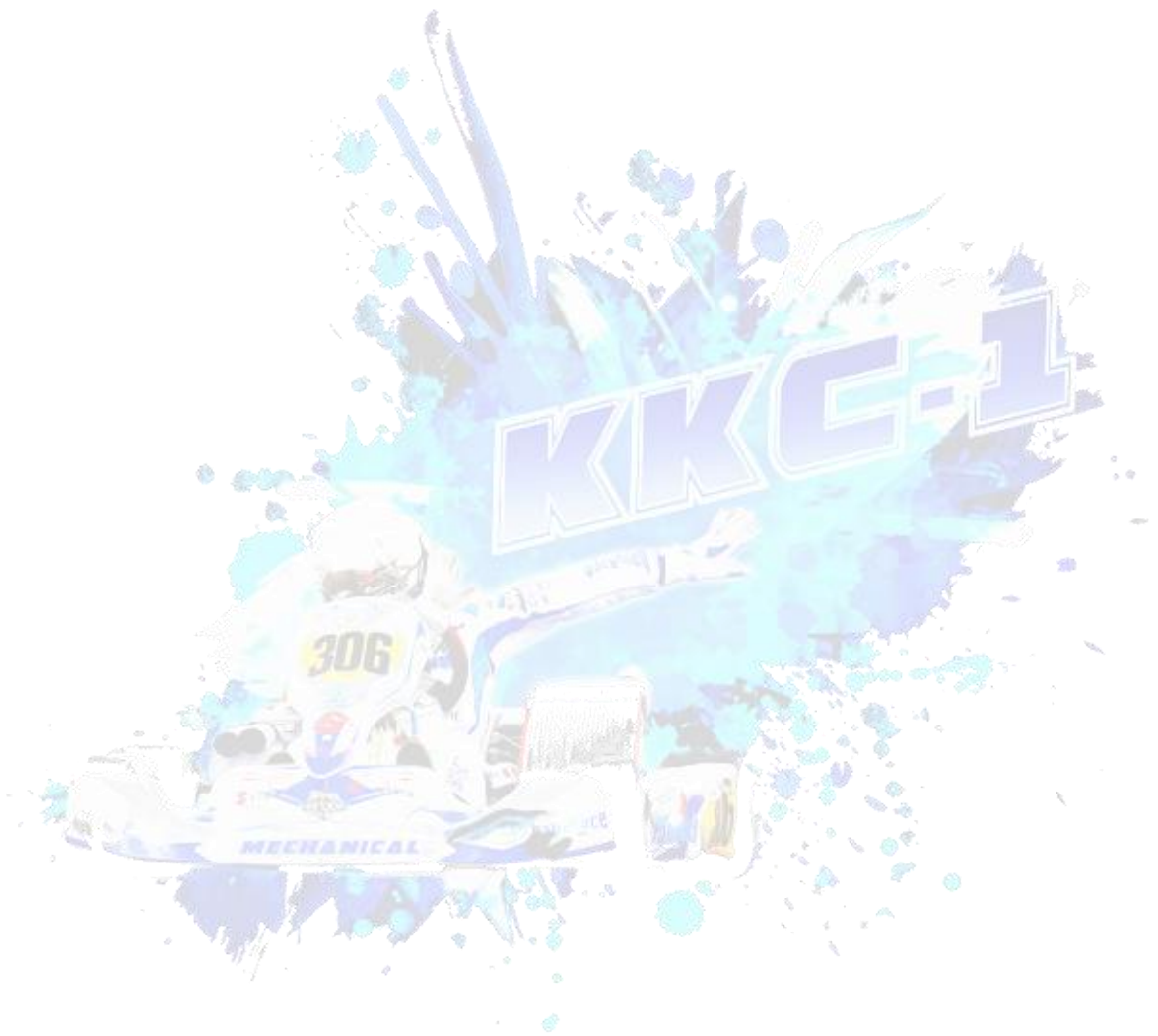
**NOTE:**

Endurance points will be awarded based on the first-round performance of the team (not the final round results). The endurance point will be considered for the award of CHAMPIONSHIP.



## 6. EVENT DATES

<b>Date</b>	<b>Event</b>
18/12/18	Technical Inspection, Static Round
19/12/18	Dynamic Rounds
20/12/18	Endurance Round



## 7. RULES – CONDUCTING THE EVENT

### 7.1. Behaviour

**Unsportsmanlike Conduct (Argument with other teams)-** In the event of unsportsmanlike conduct, the team will receive a warning from an official. A second violation will result in expulsion of the team from the competition.

**Arguments with Officials-** Argument with, or disobedience to any official may result in elimination from the competition. All members of the team may be immediately escorted from the grounds.

**Smoking and Illegal Material-** Alcohol, illegal drugs, prohibited drugs, weapons or other illegal material are prohibited on the event site during the competition. This rule will be in effect during the entire competition. Any violation of this rule by any of the team member will cause the expulsion of the entire team. This applies to both team members and faculty advisors. Any use of drugs, or the use of alcohol by an underage individual, will be reported to the local authorities for prosecution.

### 7.2. Vehicle Related

#### Vehicle Movement

Vehicles may not move under their own power anywhere but on the practice or competition tracks. Off track, vehicles must be pushed at a normal walking pace by means of Kart stand/members pushing the vehicle, with all four (4) wheels on the ground, a team member sitting in the cockpit to steer and brake and with another team member walking beside the car. During performance events when the excitement is high, it is particularly important that the vehicle should move at a slow pace in the pits.

**Damages** - Intentional damage to track/tent/other resources will result to the cash penalty of Rs 5000/- or cost of actual damage (whichever is more). Also prize and certificates will not be awarded to the particular team and team member.

Organizers have the right to modify the penalties listed in the various dynamic event descriptions to better reflect the design of their event courses, the course lengths or any special conditions unique to the site. The standard dynamic event penalties in these rules are default values that will be applied unless there is a change by the organizer.

## 8. PROTESTS

We recognize that there can be differences in the interpretation of rules, the application of penalties and the understanding of procedures. The officials and staff will make every effort to fully review all questions and resolve problems and discrepancies quickly and equitably.

### 8.1. Preliminary Review – Required

If a team has a question about scoring, judging, policies or any official action it must be brought to the organizers attention for an informal preliminary review before a protest can be filed.

### 8.2. Cause for Protest

A team may protest for dynamic round scores. Teams, team members or any other members may not protest for rule interpretations or actions.

Protest for any other issue other than dynamic round scores will be considered unethical and illegal with regards to this rulebook and appropriate legal action will be taken against such team/team members in this case. Such protest will also result in permanent disqualification or banned for future events.

### 8.3. Who can file the protest

Only team captain on behalf of whole team can file the protest. Other team members should not accompany or interfere in filing of such protest.

### 8.4. Protest Format and Forfeit

All protests must be filed in writing in prescribed manner with in stipulated time and presented to the organizer. In order to have a protest considered, a team must deposit a Rs. 5000 amount, which will be forfeited if their protest is rejected.

### 8.5. Time duration to file protest

Protests concerning any aspect of the competition must be filed within half hour (30 minutes) of the posting of the scores of the event to which the protest relates.

### 8.6. Decision

The decision of the competition protest committee regarding any protest is final and is non-challengeable.