RULEBOOK

NATIONAL ELECTRIC KART CHAMPIONSHIP

SEASON 3.0

Performance Edition

N.E.K.C.

SEASON 3.0

Performance Edition

Organized by:

CREDIBLE FUTURE
INDIA PVT. LTD.

(ISO 9001:2015 & MSME Certified)

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1. About Organization

A. Credible Future India Private Limited

Credible Future India Pvt. Ltd is a Multi Dynamic Organization working towards the Creating awareness regarding Green & Clean Energy. The Company has been a trusted name in the market for providing a pathway to new ideas. It has been providing a platform to muster all the raw thoughts generated in the minds of this generation on regular basis.

The Core team has been working from the past years to promote Green energy. To accomplish this dream, it is completely focused on conducting automotive competitive events at national level. The Organization has successfully conducted events like

Indian Solar Vehicle Championship 2018
National Electric Kart Championship 2018
Future Solar Design Challenge 2019 (Season 2.0)
National Electric Kart Championship 2019 (Season 2.0)

In this Session Company has expanded the horizons by adding two more green energy events for the students. Events for Session 2019-2020 are

Future Solar Design Challenge 2020 (Season 3.0)
National Electric Kart Championship 2020 – Performance Edition (Season 3.0)
Campus Utility Vehicle Championship 2020
National Electric Buggy Championship 2020

Apart from the Events the Organization also organizes the Technical Trainings, Workshops and Seminars to help students understanding the concept of Vehicle Fabrication & Manufacturing.

B. Our Mission

Our mission is to promote Green Energy, we as an organization are trying our level best to foster the ideas and skills of the students from engineering background. The purpose of backing these ideas and skilled hard work is to bring the ideas to value and figure out the optimum ways to utilize our sources to its best. Our organization is looking forward to cater to the different sections of society at different levels.

C. About NEKC

After the successful **NEKC Season 1.0** and **Season 2.0,** we at Credible Future India are very glad to announce the third season of the most anticipated e-karting championship of the nation **NEKC Season 3.0.** We experienced great competition between the different teams participating from across the Country. It was good to see the students embracing the new concept of electric karts and making it a successful one.

National Electric Kart Championship (NEKC) is a peculiar concept in the era of Go karting. In recent years Go-karting has embossed its way in the field of racing competition. As Go- karts has been running on engines from past years, but NEKC has lured it by introducing the concept of using Electric motor as a driving source of energy. It is proving out to be an eco-friendly concept, which is much needed for our future generations. The objective of NEKC is to provide a gateway to the future engineers to design, fabricate and conceive an Electric Go- kart. We aim at providing a platform for students to showcase their skills, exhibit their talent, and implement their thoughts in building a well fabricated Electric kart. NEKC will be looking to provide a competitive environment throughout the event which will gear up the students for their future to cope up with different situations in different industries.

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 gear up yourself to pull the throttle and win accolades across the country in **National Electric Kart Championship Season 3.0** with its special "**Performance Edition".** The parameters for Performance will be advanced for this season, so teams not only learn the vehicle fabrication but should also focus on the enhanced performance of their Vehicles.

D. Organizing Committee

The organizing team is a group of some dynamically enterprising people carrying forward a bright vision to guide and aware the future engineers, so as to prepare them for the upcoming tough times in their career. We provide a platform to young enthusiasts, engineers and kart passionate to showcase their talent at a grandeur stage. The organizing Committee fosters innovation and provides students with an opportunity to be recognized at national level for Research and Development careers in automotive engineering. Our experts from Credible Future India are always ready to guide each and every team at various steps to overcome problems faced with best possible solution

2. List of Dynamic & Static Events

Static Events Marks

- Design Evaluation 100
- Business Plan 100
- Cost Analysis 100
- Innovation 100

Dynamic Events Marks

- Weight Test 100
- Acceleration/Braking 100
- Skid Pad 100
- Autocross 200
- Blind Target 200
- Drag Race Knock-Out Round
- Endurance 400

Total **1500**

Note:-

There can be some surprise events as well depending upon the conditions and the management.

Official Announcements

The entire announcement regarding the National Electric Kart championship will be published on-official website and on Facebook & Instagram page as well.

http://www.crediblefutureindia.com

http://www.nekc.in

https://www.facebook.com/nationalelectrickartchampionship

https://www.instagram.com/nationalelectrickart

3. Rules and Organizing Authority

A. Rules Authority

All the participating teams are required to follow rules and regulations of the event. Organizing Committee has got the complete right to impound each and every rule associated with the event. Violation of any of the mentioned rules by any of the participating team members may be liable to be penalized severely; it may include disqualification of the team from the competition at any stage or withdrawal of award/awards, as well. Queries or questions concerning the meaning or intend of these rules will be resolved by NEKC organizing committee during competition onsite.

B. Rules Validity

The rules will remain same throughout the event. However, amendments (if any) made according to the circumstances will be updated to all the participating teams. No excuses of any of the teams shall be entertained for disobeying any of the rules.

C. Participating in the Competition

Teams, team members as individuals, 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 will have to abide by all the rules and regulations of the event set by the organizing authorities.

D. Right to Impound

National Electric Kart Championship & Credible Future India Pvt. Ltd reserves the right to impound any onsite registered vehicle at any time or at any stage during the competition for inspection and the examination by organizers, officials and technical inspectors.

E. General Authority

NEKC (National Electric Kart Championship) 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 judgment, required for the efficient operation of the event.

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, then the organizers have full authority to reorganize event/particular round at their sole discretion without being questioned.

4. Eligibility

A. Team Requirements

Teams registering for **National Electric Kart Championship** are required to have a Team Name and Team Captain. It is optional for the team to have a Faculty Advisor & Team Logo but strongly recommended to have both. 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. There must be **10 members (min)** to **30 members (max)** in a team under any circumstances.

B. Eligibility Criterion

Only undergraduate students from engineering degree/diploma can participate to ensure that this event is a platform of competition for technical students from different fields of engineering.

Every members of the team participating in this competition must satisfy the following requirements:-

Team members must be enrolled as degree/diploma seeking undergraduate student in a college or university. **Team members who have graduated before the year 2019 or in 2019 are not eligible to participate.**

C. Faculty Advisor Requirement

Each team is expected to have a Faculty Advisor appointed by the university/Institute. However the presence of Faculty Advisor at event venue is not mandatory but it is strongly recommended that team comes along with Faculty Advisor(s). Maximum of **Two faculty** members can accompany a single team. In case extra faculty members joins the team, they will be treated as guest faculty at the event venue and would not be eligible for Dronacharya Award. The faculty advisor is expected to work as a team advisor 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.

D. Registration Requirement

The registration and fee submission will proceed in two stages-

- Registration for the Virtual Round ***(No Elimination)***
- Vehicle registration and team registration after the declaration of Virtual Round results

E. Team Registration

Online registration will be open on our website www.nekc.in from 30th April 2019. Once the team has been registered online, the payment of Phase 1 must be done before the registration deadline (In case of payment failure within the due dates, online registration will be cancelled).

WILDCARD ENTRY: Only the teams who have participated in any of the e-kart events across the nation are eligible to register as a Wildcard entry, these teams will have privilege of skipping the virtual round and can take part in dynamic round directly. These teams will have to submit all the documents in order to qualify for the eligibility. Only **5 Teams** will be taken under this entry on first-come first-serve basis.

F. Registration Agreement

By registering in NEKC 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.

G. Registration Fee

- **Virtual round**

Team registration fees of **₹ 10200 + 18% GST** per team. The registration fee is non-refundable or non-adjustable in any circumstances.

- **Dynamic round:-**

Team registration fees of **₹ 15300 + 18% GST** per team

In order to promote '***Female Participation in Automotive Events'*** Credible Future India is providing special discount of Rs.500/- for each female participant of the team (Maximum upto 3000) only applicable on dynamic round fee.

In case of "All Girls" team participating in event the fee for the dynamic round is **₹ 10000 + 18% GST**

It is mandatory for all the female participant(s) to be present at event venue for which discount has been availed, failing to which the teams have to pay the difference with penalty.

Wild Card Entry:

Team registration fees of **₹ 23000 + 18% GST** per team (total).

The registration fee is non-refundable or non-adjustable in any circumstances.

H. Mode of Payment

- On Event Website by Payment Gateway **(Recommended)**
- Direct Transfer to Bank by NEFT/IMPS
- UPI (BHIM, PhonePe, TEZ etc.)

Account Details for the payment to be made are as follows:

Account Number	**201002544084**
Account Holder Name	**Credible Future India Private Limited**
Account Type	**Current**
Bank	**Indusind Bank**
IFSC Code	**INDB0000368**
Branch	**Okhla, New Delhi**

Teams need to send the screenshot/receipt of the payment done from their the official team Mail ID to nekc.future@gmail.com and also Whatsapp the receipt to +91-9667950033 along with Team Details.

5. Driver's Requirements

A. Age

Every Team is supposed to have two drivers (Driver & Co-driver) and both the drivers of the team must be of 18 or above years of age.

B. Driver's License

Each driver must be having a valid Driver's License (Four Wheeler) issued by the Government of India. The date of issue of license should be at least one year back from event date. Both drivers must provide a copy of license when demanded by the Technical team at the time of Technical Inspection.

C. Medical Insurance

Both the drivers must have valid medical insurance at the time of the event.

D. Driver's Safety Gear

Following is the minimum list of requirements that a driver should be possessing at the time of technical inspection and all dynamic events. All the accessories of Driver's Safety Gear must meet the standard rating (specified). No driver would be allowed to drive the vehicle without the complete driver's safety gear in any of the dynamic events. All the safety gears must have a label attached carrying the name of manufacturer with month & year of manufacturing.

- **Driver's Suit**
  A fire resistant suit (one piece), made from a minimum of 1-layer to multiple layered that covers the body from the neck to the ankles and the wrists. The suit must have a factory label showing that it is **SFI rated, FIA rated**.

- **Underclothing**
  If the driver is wearing a single layer suit then the under clothing is mandatory, i.e. (a t-shirt of cotton and long pants down to ankles).In case the driver is wearing a three layer suit then the underclothing is optional.

- **Helmet**
  A well-fitting closed face helmet with an integrated (one piece composite shell) that meets one of the following certifications and is labeled 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 **(padded & full faced)** are allowed

Open-faced/half faced helmets are not allowed. All helmets to be used by the driver must be presented during the Technical Inspection.

- **Neck Support**
  All drivers must wear a neck support/collar. The neck support must be a full circle (360°) and SFI rated (SFI 3.3). Horseshoe collars are not allowed.

- **Gloves**
  Drivers must wear **full hand** racing gloves. Fire restrained gloves with extra foam are acceptable. **Gloves must be SFI/FIA Rated**.

- **Shoes**
  Fire resistant shoes made from acceptable fire resistant material, shoes must be certified to the standard and labeled as such.
  SFI 3.3 or higher FIA 8856-2000

- **Socks**
  Fire resistant socks made from acceptable fire resistant material or cotton socks that cover the exposed skin between the driver's suit and the boots/shoes.
  All the safety gears are available on www.shop2race.com

6. Vehicle Requirements

A. Chassis Design Requirements

The vehicle must necessarily have four (4) wheels. The vehicle must have a wheelbase within the range of **40 inches to 56 inches**. The wheelbase is measured from the center 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 clearances (gap) between the driver and any component of the vehicle in static and dynamic condition – hands, torso, thigh etc. The overall length of vehicle must be less than 76 inches and overall width must be less than 60 inches. The maximum height should be less than 45 inches from the ground. Holes in chassis are **not** permitted.

B. Chassis Material

The tube/rectangular pipe used in the fabrication of the chassis or the other frames/supports should be **seamless** (seamed pipes are not allowed). Minimum cross section must be 1 inch (25.4 mm), for pipe it will be OD and for rectangular section or square section, it will be its minimum height**.** The pipe material used for chassis must have minimum wall thickness of 1.5 mm. the material used in chassis should have a minimum **carbon percentage of 0.18%. Material certification** is essentially required to be produced during the technical inspection. Material should be certified from any of the recognized material testing laboratories for its chemical and mechanical properties, the same report should be presented at the time of inspection and throughout the event. Chassis material is also available @ www.shop2race.com

C. Wheelbase and Wheel Track

The wheelbase of the vehicle must be within 40-56 inches and the smaller wheel track (front or rear) must be no less than 70% of the wheelbase of the vehicle.

D. Ground Clearance

With the driver aboard there must be a minimum clearance of **1.5 inches** from the ground to the lowest point of the vehicle (except tires) of the vehicle. No compensation (like chain sprocket, brake disc in ground clearance would be entertained). However teams are advised to keep the maximum possible ground clearance.

E. Bumper (Front and Rear)

Bumpers must be installed in the front and rear of the vehicle such that they cover the tires 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 1.50 mm. Bumpers must have proper accessibility for use as towing point for towing purpose.

F. Steering System

The steering system must be able to control at least two wheels (simultaneously). 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. The turning radius of kart should be less than or equal to 2.5 meters.

G. Suspension

No Suspension allowed. (Any kind of suspension system is **not** allowed)

H. Braking System

The brakes are compulsory on at-least one of the axles either front or back and brake 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.

I. Pedals

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 and should have minimum area of 25 sq. cm.

J. Visibility Requirement

The power train compartment must be completely visible to examiners at the time of inspection.

K. 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 1 inch away from the protecting wall'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 during cornering or braking. Under any condition the seat must not protrude below the lowest plane of the chassis frame. Only go-kart bucket seat is acceptable. Seats used from chairs or stools or seats are strictly prohibited.

An example of the allowed seat is given below

L. Front Bodywork

The bodywork of the front part must be designed such that the vehicle number and the team logo may be displayed clearly. The driver egress (exit time) should be less than 5 seconds in any circumstances.

M. Brake Light

The vehicle must be installed with a brake light **red** in color which is 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 centerline*. All the electrical connections done must be well insulated and should be tied properly.

N. Horn

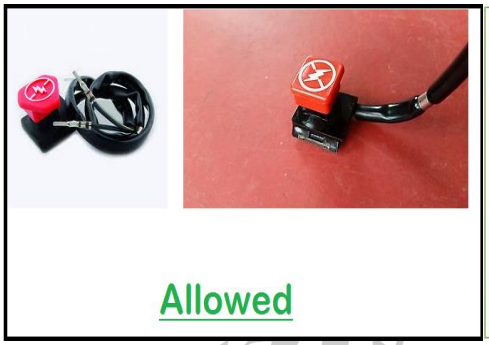
The vehicle must have a horn installed and must be easily accessible.

O. Battery

The battery pack voltage used should not exceed 48V nominal, the maximum battery pack capacity should be of **110Ah**.
The vehicle electronics (e.g. Lightings, horns) can be optionally operated by separate battery, but this battery should not exceed voltage 12V and 10Ah. Battery should be cover/insulated properly. In case of **Li-Ion and Li-PH** battery pack must be equipped with proper **Battery Management System**. BMS is mandatory and teams will be disqualified on non-compliance of the rule. A permanent fire Insulation covering must completely cover the vehicle's propulsion and energy storage systems.

P. Kill Switch

The function of the kill switch is to disconnect all the electrical circuits from the battery except Brake light. The electrical system must include at least two kill switches. It should be a push/pull type switch or Rotary type kill switches. As shown below. *The kill switch must not come out in any circumstances*.



Kill switches locations-

- **Cockpit Switch** – The cockpit switch must be located in the cockpit within easy reach of the driver. The switch must not be mounted on a removable steering wheel assembly.

- **External Switch** – The external switch must be mounted anywhere on the driver's right side of the vehicle facing outside of the body panels, the switch must be within easy reach of track volunteers, the switch must be mounted rigidly, with no sharp edges nearby. Kill switch are also available at www.shop2race.com

Q. Wheels and Tires

Teams must use standard go-karting tires. Acceptable tire size for front is **10x4.5-5** and for rear tyre **11x7.1-5.** (All dimensions in inches)
www.shop2race.com

R. Rear View Mirrors

Every vehicle must be equipped with the rear view mirror in both the sides of the driver. No vehicle would pass the T.I without the mirrors.

S. Lock Nuts

Locking nuts are **mandatory** to be used everywhere in the vehicle.

T. Bolts

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

U. Fire Extinguisher

Each team must have at least **two (2)** no's of fire extinguisher each of **1(one) KG** ABC type. One fire extinguisher must be mounted on the kart within the reach of driver and other with a team representative accompanying the kart throughout the event. Fire extinguisher should be in proper working condition. It should be accompanied with a sticker or a bill clearly mentioning its expiry date.

V. Path for Wires and Pipes

In any case no pipeline/wire connections should go under the chassis. Doing so can lead to penalty and even disqualification from the event.

W. Roll Over Protection

Every kart must have a roll over protection which should be at the back of the driver seat with the height at-least **3 inches** above the driver's head (wearing the helmet) on the driving seat in driving position.

X. Protecting wall

Protecting wall is a boundary which protects the driver from the motor, battery and the rotating parts (such as sprocket/chain/belt pulley etc.). The protecting wall must be made up of a suitable fire resistant material which will solve the purpose of safety. The design of the wall must be in such a manner that driver's body parts are not affected by the motor heat, battery fluids and the rotating parts at any time during the dynamic/static condition. There should be min 1 inches clearance between the wall and the motor. It can be made at the back of driver's seat using the roll over protection.

Y. Seat Belt

Seat belt of minimum 2 point (lap belt) is mandatory.

Z. 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 can be metal, fiberglass, plastic, or any other 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.

AA. 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 in this regard will be final and binding to all. This is in the interest of safety of all teams.

BB. Kart Stand

It is **Mandatory** for the team to bring kart stand, the stand. The stand is expected to be at least 35 inches tall. Take special care for the stability of the stand and probable motion restrictors to ensure maximum usability. It must be painted with red color. Teams are free to select or design their own kart stand.

CC. Vehicle cost

The vehicle must be manufactured in the budget **Rs. 100000 (**excluding battery, driver gears and safety equipment's cost). The cost of Batteries must be given separately in the cost report.

Each team must carry their own rain covers for their karts at the dynamic event venue as a precaution to safeguard all your electrical equipments in case of unexpected rain.

7. Vehicle Power Train

Teams are free to select any motor meeting following requirements-
The System Peak Power should not exceed **3000 W**.

The acceptable specification of the power train is mentioned below.

- Motor type: BLDC/PMDC/hub motor wheel.
- Peak System Wattage: Peak Wattage of system is limited to 3000 W in all.
- Number of motors: 01
- (02 in case of hub wheel but total power should not exceed 3KW)
- Motor wattage (Total): up to 3000 W rated.
- Maximum RPM should not exceed: 3600 RPM
- Maximum System (Battery, Motor) Voltage: 48V
- Transmission type: Geared/Non-geared/chain-sprocket etc.
- Power Source : Battery only
- Maximum rated current : 70A
- Maximum peak current: 110A
- Charger voltage : 220V 50Hz
- Controller Voltage: Maximum 60V
- Controller current capacity: As per motor, battery specifications.

Teams can design their vehicle at any maximum safe speed. This can be done by selecting an appropriate final drive reduction.

A. Motor Controller

The speed controller for the motor should be in accordance with the motor specification. A higher grade controller is always beneficial to avoid cut offs. For a motor connected at 48V the controller will be rated higher than 48V to avoid controller damage but the controller used should not be more than 60V.

B. Fuse or Circuit Breaker-

One or more Fuses or circuit breaker should be installed in the power line i.e. from batteries to controller, to shut down the vehicle in the event of a fault in traction circuit. Minimum of 1 fuse (of rating<= max System Current) is mandatory at primary output of battery; If vehicle electronics(e.g. horns) operates at separate voltage, 1 Fuse or circuit breaker is mandatory in that circuit.
Under no circumstances teams will be allowed on track without specified fuses installed. All fuse locations must be chosen such that they are easily accessible for verification/replacement. Fuse specification should be clearly readable. Cartridge fuses are recommended.

C. Reverse movement

A reverse movement is mandatory in the kart (changing the polarity is one of the convenient option) which can be obtained through motor controller.

D. 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 flies 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. Non rigid, fabric coverings such as “Frog skin”, Ceconite, and neoprene are unacceptable for use as finger guards.

All the electrical equipments are available at www.shop2race.com

8. Vehicle Number and Logos

NEKC authorities will assign a number to each vehicle after the Virtual Round. Teams may request for specific vehicle numbers of their choice, but no single digit number will be allotted to any team. Numbers will be allotted to teams on “First come first served” basis. Teams can select their desired number from event website after result of Virtual Round.

A. Decals

NEKC authorities will provide two adhesive decals to each team at the time of the event. Each vehicle should have sufficient space on front and rear side for these stickers.

B. Number Assignment

It is the responsibility of the team to provide its vehicle number markings. The numbers must be clearly visible from all sides, front, and rear of the vehicle. The numbers must remain readable throughout the competition. The height of numbers must be at least 152.4 mm (6 in). And must have a minimum line width of 15 mm (0.6 in.) and 76.2 mm (3 in) wide.

It is mandatory to stick kart number in **BLACK** font color and in **light yellow** background only. Refer below images for kart number position.

Front

side

Rear

C. Team Logo (Optional)

The team can design their own logo, and display the same on the vehicle.

D. Team Name

All the vehicles must display their team name on vehicle in such a manner that it is readable throughout the competition

E. College Name

Teams are advised to display abbreviated or full college name on their vehicle.

9. Virtual Round

A. General Guidelines

- Virtual round is a No Elimination round. In this round Old/New teams have to submit their presentation report and there would be no online representation of the PPT. Teams just have to submit the PPT in the given time interval. Teams will be judged and examined on the basis of Data they have shown in the PPT.

- The presentation should include Design report, innovation report, understanding of rule book, Cost study and analysis, DFMEA and DVA. Judges will also be checking team's representation skill for the PPT.

- The presentation format will be provided to all the teams.

- Presentation once submitted will be considered as the final, so teams are advised not to resubmit the PPT again and again.

B. Presentation Guidelines

- The teams have to submit the presentation at nekc.future@gmail.com
- No presentation will be entertained after the declared deadline.
- The presentation of all the teams will be sent to related professionals for assessment.
- If found necessary there will be a Q/A session with the team over phone/video call.
- After assessment of all the presentations the result will be declared.
- The number of slides will be limited to 24 (max). Therefore, teams must adhere themselves to the limitation.
- The teams who are participating for the second time/previously participated in season 1 needs to show the changes in every slide as per their improvement.
- All the slides must be numbered in the bold font of Times New Roman with size of 36 and placed at the bottom right hand corner of each slide.
- Team must use Times New Roman font only with minimum size of 14 to write anything on the slides.
- In the presentation, team will be judged, based on their basic understanding of automotive engineering and fundamental principles covering entire vehicle and all important aggregates. Showing extensive design calculations/analysis is not necessary at this stage. It is important to show clarity of understanding basic design

approach/principles.

- The presentation must be in MS Power Point Format (.ppt or .pptx). The teams are required to send the presentation in Adobe Acrobat Format (.pdf) too. Both these files must be send to official email id before the deadline for the virtual round.

You are hereby requested to provide maximum data in your presentation regarding the vehicle. The data provided in the presentation should be precise as only up to **20%** deviation of specifications will accepted in the dynamic round, when compared to the data presented in the Virtual Round.

C. Presentation Sequence

S.no	***Particulars***	***Criteria Description***	***Marks***
1.	**General**	Team Name and Team ID	0
2.	**Rulebook**	Top 10 salient points to be in order of Importance/priority as team thinks.	10 (OLD Team)
		Top 10 salient points to be in order of Importance/priority as team thinks.	20 (New Team)
3.	**Comparison**	Changes and improvement from previous season of NEKC (Only for OLD Teams)	10 (OLD Teams)
4.	**Specifications**	Preliminary technical specifications & overall Performance targets. 2D/ 3D views of the proposed vehicle design	100
5.	**Design Report**	Design consideration for chassis, steering, Design Analysis, electrical, transmission and braking system etc.	100
		DFMEA Report	50
		Design Validation Plan	40
		Project Plan	30
6.	**Cost Analysis**	Estimated cost of all the parts to be used and financing for the project	80
7.	**College Facilities**	Manufacturing processes required for various important vehicle aggregates, machine tools/ hand tools and other facilities required. Facilities available in the college workshop.	50
8.	**Skills**	Representation of the slides with proper data.	50
9.	**Innovation**	Any Innovation to be used in the vehicle by the Team.	80
Total			**600**

10. Final Round

Static Events

A. Vehicle Design Analysis

The vehicle will be verified with the final design report. Deviating up to 20% from the final design report is acceptable but on further deviations teams will be penalized accordingly.

B. Weight Test

The Scoring will be based on the minimum weight of the Vehicle without Driver.

Scoring

$$\text{Weight Test Score} = 100 \times (W_{Max} - W_{Yours}) / (W_{Max} - W_{Min})$$

Where

W_{Max} = Maximum Weight of any vehicle
W_{Min} = Minimum Weight of any vehicle
W_{Yours} = Weight of your vehicle

C. Vehicle cost Analysis

The cost report will be verified with the actual cost of the components and systems used in the vehicle at the time of Dynamic Event. The cost of the components/systems mentioned in the cost report must not vary with that of used in the vehicle. The vehicle presence is mandatory for cost evaluation at their pits and teams are advised to keep the original bills for ready reference.

D. Business Plan

The business plan should consist of proper evaluation of company for a manufacturing capacity of 1000 karts per year. A presentation will be given by the each team representing all the details. Min. of 2 and Max. of 4 members are allowed for the presentation. Teams are free to use any format and approach. Slides should not exceed 12 in number.

E. Manufacturing Level/Build Quality

Good engineering practice will reflect a great manufacturing level. The vehicle will be examined by the judges at the time of Dynamic Event, so the participating teams are advised to manufacture the vehicle with pre-planned strategies so that the vehicle would be able to compete in several tasks and tests.

F. Innovation

The innovation shown 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. Teams can show the concept with the help of prototype as well.

G. Technical Inspection

The teams will be tested for all parameters being followed as mentioned in rule book during the fabrication of vehicle. The team will be allowed only two chances for the Technical Inspection failing to which the team will be not be allowed for the dynamic events.

H. Dronacharya Award Assessment

This is the assessment is for selecting the best Faculty Advisor. The detailed process will be declared at the dynamic event venue. This does not contain any marks.

Dynamic Events

A. Brake and Acceleration Test

It is mandatory for a vehicle to pass the **brake test** to participate in any of the dynamic events. The vehicle has to accelerate on full throttle and must stop in a straight line after the brake is applied on the vehicle. Each vehicle will be given 3 attempts to pass the brake test.
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 however allowed provided that the vehicle does not deviate more than 60 degree from the initial course of motion otherwise the attempt will be nullified. Vehicle's speed must not be less than 30 kmph while attempting this test.

Brake Test does not have any points, but it is mandatory for a vehicle to pass the test to participate in any dynamic event. This test is having marks for **acceleration** and vehicle will be given ranking accordingly i.e. the vehicle which will cover the track in minimum time will be the fastest.

Final decision will rest in the hand of Judges for clearing any vehicle for brake test.

- **Scoring**

Acceleration Score = $100 \times (T_{Max} - T_{Yours}) / (T_{Max} - T_{Min})$

Where
T_{Max} = Maximum time taken by any vehicle
T_{Min} = Minimum time taken by any vehicle
T_{Yours} = Time taken by your vehicle

B. Skid Pad Test

The objective of the skid-pad event is to measure the Kart cornering and drifting ability on a flat surface while making a constant-radius turn and maneuverability across the given track. Each team may make two (2) attempts may or may not with different drivers. Scoring will be based on the better of the two attempts. Timing may be done using either electronic systems or stopwatches.

- **Layout**

There will be two (2) pairs of concentric circles in a figure of eight pattern within the track. The centers 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 bethe2.5 m path between the inner and outer circles and across the whole track the track width will be near about 64-68 inches max. A lap is defined as travelling around the track from start to stop line.

- **Penalties:-**

- **Cones down or Out-** A penalty of few seconds will be added to the time for every cone that is knocked —down or out (including gate cones).
- **Out of the line –** Penalty will be there if the vehicle tire comes out of the line at any point in the track
- **Skip the turn:** If any kart misses the turn or wanted to skip the turn, then separate penalty will be there for the same.

- **Scoring**

Skid Pad Score = 100 x (T_{Max} – T_{Yours}) / (T_{Max} – T_{Min})

Where
T_{Max} = Maximum time taken by any vehicle
T_{Min} = Minimum time taken by any vehicle
T_{Yours} = Time taken by your vehicle

C. Blind Target

The objective of this event is to test the co-ordination of the driver with the team members. In this event driver has to come across several obstacles in reverse direction in a track size of 10-20m with his neck straight forward without turning back and 2 members of the same team can guide the driver across the track to overcome the hurdles and achieve the required target. There will only be Single attempt for this event.

- **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).
- **Out of the line –** Penalty will be there if the vehicle tire comes out of the line at any point in the track
- **Skip the turn:** If any kart misses the turn intentionally or unintentionally, then separate penalty will be there for the same.
- **Miss the target:** If at last the kart is out of the target zone then penalty will be there for the same.

- **Scoring**

Blind Target Score = 200 x (T_{Max} – T_{Yours}) / (T_{Max} – T_{Min})

Where
T_{Max} = Maximum time taken by any vehicle
T_{Min} = Minimum time taken by any vehicle
T_{Yours} = Time taken by your vehicle

D. Drag Race

This is a knockout event. Two vehicles will be competing against each other on a straight stretch of 100 meter. The vehicle taking minimum time wins.
Pairing of the teams will be done by chit system and the exact procedure will be revealed at the event only. This event does not carry any marks and will have no effect on Vehicle participation in endurance round.

E. Autocross

The objective of this event is to evaluate the vehicle's maneuverability and handling qualities on a tight course without the hindrance of competing vehicles. The course will combine the performance features of acceleration, braking, and cornering into one event. Each team may take two (2) attempts, with or without different drivers. Scoring will be based on the best of the two attempts. Timing may be done using either electronic systems or stop watches.

- **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).
- **Out of the line –** Penalty will be there if the vehicle tire comes out of the line at any point in the track
- **Skip the turn:** If any kart misses the turn intentionally or unintentionally, then separate penalty will be there for the same.
- **Miss the target:** If at last the kart is out of the target zone then penalty will be there for the same.

- **Scoring**

$$\text{Autocross Score} = 200 \times (T_{Max} - T_{Yours}) / (T_{Max} - T_{Min})$$

Where
T_{Max} = Maximum time taken by any vehicle
T_{Min} = Minimum time taken by any vehicle
T_{Yours} = Time taken by your vehicle

F. 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.

- **Procedure**

The final event will be run as a single heat approximately 60 minutes (min) to 90 minutes (max). Teams are not allowed to work on their vehicles during the heat. Wheel-to-wheel racing is prohibited. Passing another vehicle may only be done in an established passing zone.

- **Vehicle Breakdown and Stalls**

If a vehicle breaks down it will be removed from the track by the volunteers, only 5 member from team can make the required repair there itself without disturbing the event and will be allowed to re-enter the track. If a vehicle stalls, or ingests a cone, etc., it will be allowed to restart and re-enter the course where it went off. If a vehicle stalls and cannot be restarted without external assistance, the track workers will push the vehicle clear of the track. At the discretion of event officials, two team members may retrieve the car under direction of the track.

- **Penalties**

- **Failure to obey a flag:** 30 points
- **Over Driving:** 30 points
- **Vehicle to Vehicle contact:** 50 points
- **Team members on track:** 10 points each
- **Out of Order- Running out of track:** 30 points
- **Mechanical Problem:** No additional penalty other than the time lost to ensure that the car is safe to continue.
- **Reckless or Aggressive Driving-** 50 points to 100 points
  Any reckless or aggressive driving behavior (such as forcing another car off the track, refusal to allow passing, or close driving that would cause the likelihood of car contact) will result in a black flag for that driver. When a driver receives a black flag signal, he must proceed to the penalty box to listen to a reprimand for his driving behavior.
- **Inexperienced Driver-** the Director of Operations may disqualify a driver if the driver is too slow, too aggressive, or driving in a manner that, in the sole opinion of the event officials demonstrates an inability to properly control their vehicle.
- **Intolerant behavior:** 30 points
  Use of abusive language to members of any teams/volunteers/Organizing Committee and this could lead to permanent disqualification as well.

- **Scoring**

Endurance Score = [400 x (L_{Yours} – L_{Lowest}) / ($L_{Highest}$ – L_{Lowest})] – Penalties*

Where

$L_{Highest}$ = Highest number of laps completed by any vehicle

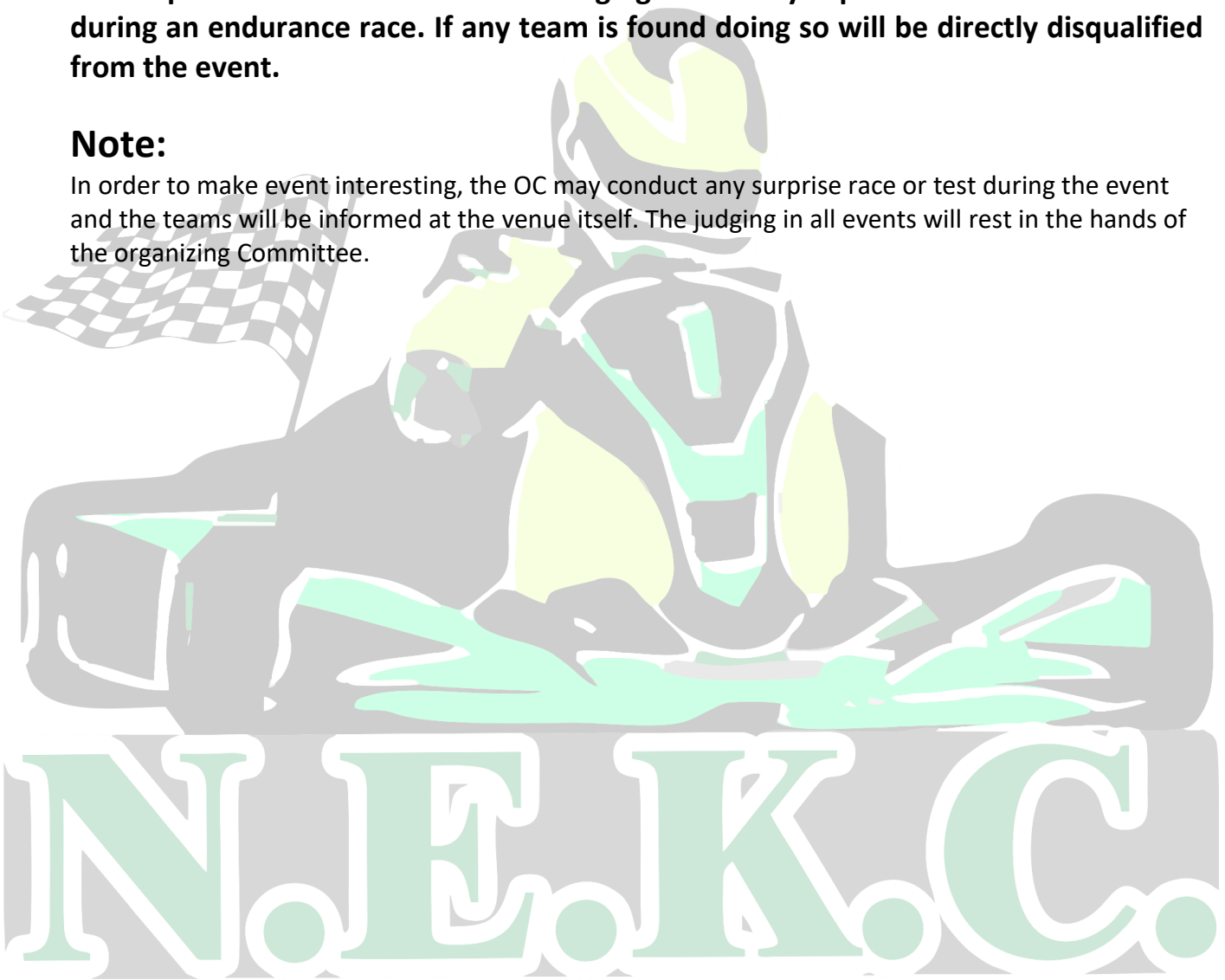
L_{Lowest} = Lowest number of laps completed by any vehicle

L_{Yours} = Number of laps completed by your vehicle

It is important to note that No recharging or battery replacement will be allowed during an endurance race. If any team is found doing so will be directly disqualified from the event.

Note:

In order to make event interesting, the OC may conduct any surprise race or test during the event and the teams will be informed at the venue itself. The judging in all events will rest in the hands of the organizing Committee.



11. General Rules for Conducting the Event

A. Behavior

- **Sportsmanship Conduct**

  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. Failure of a team member to follow an instruction or command directed specifically to that team or team member will result in a twenty five (25) point penalty.

- **Arguments with Officials**

  Argument with, or disobedience to, any official may result in the team being eliminated from the competition. All members of the team may be immediately escorted from the grounds.

- **Smoking and Illegal Material**

  Alcohol, illegal 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 a 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.

B. Vehicle Related

- **Vehicle Movement**

  Vehicles may not move under their own power anywhere but on the practice or competition tracks unless allowed by the judges. Off track, vehicles must be pushed at a normal walking pace by means of kart stand/members pushing the vehicle, with all four 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 car be moved at a slow pace in the pits. Violation of this rule will result directly into the 25 points penalty.

- **List of Prefabricated Parts**

  All the teams have permission to buy the readymade/fabricated parts but use of these parts in excess may lead to the disqualification of the vehicle or penalty of 200 points. List of the prefabricated parts- Brake disc, caliper and brake holding assembly, master cylinder, Seat, Seat Belt, Steering gear box, Steering column, Steering wheel, Wheel rims &Tires, tie rod ends, motor, battery.

C. Penalties

- **Violation of rules**

  Penalty of 50 points/ disqualification.

- **Misbehavior/arguments with officials or volunteers**

  Penalty of 100 points/ disqualification.

- **Tampering with TI sticker or making restricted changes in vehicle after TI**

  Penalty of 100-500 points depending upon the severity/disqualification.

- **Entry without permission on tracks**

  100 points/ disqualification.

- **Damages**

  Intentional damage to track/tent/other resources will result to the cash penalty of ₹5000/- or cost of actual damage whichever is more. Also prize and certificates will not be awarded to the particular team and its members.

  Organizing committee 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 organizing committee

Prize categories for National Electric Kart Championship

- Overall Winner
- Over All Runner up
- Endurance Winner
- Endurance Runner Up
- Drag Race Winner
- Drag Race Runner Up
- Auto Cross Winner
- Auto Cross Runner up
- Blind Target Winner
- Blind Target Runner Up
- Skid Pad Winner
- Skid Pad Runner Up
- Light Weight Award
- Best Design
- Best Aesthetics
- Best Driver
- Business Plan
- Cost Report
- Best Team Spirit
- Innovation Award
- Build Quality Award
- Dronacharya Award
- Virtual Round Winner
- My Ride My Glory Award
- On the Spot Surprise Prize

Contact Us

In case of any queries or questions please,

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