RULEBOOK

GO KARTING
CHAMPIONSHIP - 2018

CONTENTS

Go Karting Championship - 2018 is an intercollegiate engineering design competition for undergraduate and graduate engineering students. The objective of the competition is to simulate real-world engineering design projects and their related challenges. Each team is competing to have its design accepted for manufacture by a fictitious firm. The students must function as a team to design, engineer, build, test, promote and compete with a vehicle within the limits of the rules. They must also generate financial support for their project and manage their educational priorities.

Each team's goal is to design and build a single-seat, on road kart, sporting vehicle whose structure contains the driver. The vehicle should aspire to market-leading performance in terms of speed, handling, ride, and ruggedness over on-road conditions. Performance will be measured by success in the dynamic events which are described in the Go Karting Championship - 2018 Rules, and are subject to event-site weather and course conditions.

Vehicles entered into Go Kart Championship – 2018 competitions are expected to be designed and fabricated in accordance with sound engineering practices.

A .RULES AND ORGANIZER AUTHORITY

A.1	Rules Authority	Go Karting Championship-2018 rules are the responsibility of Rules Committee and are issued under the authority of the GO KARTING CHAMPIONSHIP-2018 Committee.
A.2	Rules Validity	Go Karting Championship-2018 rules posted on the official Website and dated for the calendar year of the competition are the rules in effect for the competition. Rule sets dated for other years are invalid.
A.3	Rules Compliance	By entering a Go Karting Championship-2018, the team members, faculty advisors and other personal of the entering university agree to comply with, and be bound by, the rules and all rules interpretations or procedures issued or announced by GO KARTING CHAMPIONSHIP-2018, Go Karting Championship-2018 Rules Committee and other organizing bodies. All team members, faculty advisors and other university representatives are required to cooperate with, and follow all instructions from competition organizers, officials and judges.
A.4	Understanding the Rules	Teams are responsible for reading and understanding the rules in their entirety for the competition in which they are participating. The section and paragraph headings in these rules are provided to facilitate reading: they do not fully explain all the paragraph contents. If the participating teams encounter any ambiguities or query/questions concerning the meaning or intent of these rules will be resolved by Technical Committee only. To seek clarification regarding the rules teams should communicate via mail to Technical Committee at Gkc2k18@gmail.com. Teams must keep the records of all such email communications ready for reference of judges/inspectors during the main event.
A.5	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 safety remains paramount during event, so any perceived loopholes should be resolved in the direction of increased safety/ concept of the competition.
A.6	Participating in the Competition	Teams, team members as individuals, faculty advisors and other representatives of a registered university who are present on-site at a 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 earlier by withdrawing.
A.7	General Authority	GO KARTING CHAMPIONSHIP-2018 Organizing Committee reserves the right to revise the schedule of any competition and/or interpret or modify the competition rules at any time and in any manner that is, in their sole judgment, required for the efficient operation of the event.
A.8	Code of conduct	

B. PARTICIPATION REQUIREMENTS

B.1	Team size	Minimum	10
		Maximum	25
		Faculty advisor	1
		No compulsion for all students should be of same college.	
		Multiple teams can be registered from same college.	
B.2	How to Register	Teams can register at www.gkc2018.com Or WhatsApp your team details @ 9964623335 Or call on 9964623335	
B.3	Fees	20,000/- (inclusive of 18% tax) per team	
B.4	Mode of payment	Once the online registration is completed, the mode of payment details would be mailed.	
B.5	Eligibility Limits	Eligibility is limited to undergraduate and graduate students to ensure this is an engineering competition rather than a race. Individual members of teams participating in this competition must satisfy the following requirements:	
B.6	Student Status	Team members must be enrolled as degree seeking undergraduate or graduate student in a college or university. Team members who have graduated during the last seven (12) month period prior to the competition remain eligible to participate.	
B.7	Age	Team members must be at least eighteen (18) years of age at the time of the competition.	
B.8	Liability Waiver	All on-site participants and faculty are required to sign a liability waiver upon registering on-site.	

C. FACULTY ADVISOR

C.1	Faculty Advisor Status	Each team is expected to have a Faculty Advisor appointed by the university. The faculty advisor is expected to accompany the team to the competition and will be considered by competition officials to be the official university representative.
C.2	Responsibilities	Faculty Advisors are expected to advise their teams on general engineering and engineering project management theory.
C.3	Limitations	Faculty advisors may not design any part of the vehicle nor directly participate in the development of any documentation or presentation. Faculty Advisors may neither fabricate nor assemble any components nor assist in the preparation, maintenance, testing or operation of the vehicle. Faculty Advisors are not allowed to participate during technical inspection, cost audit or design presentations. The team captain or other designated members of the team must do all the presenting although Faculty Advisors may silently observe. In brief – Faculty Advisors may not design, build or repair any part of the vehicle.

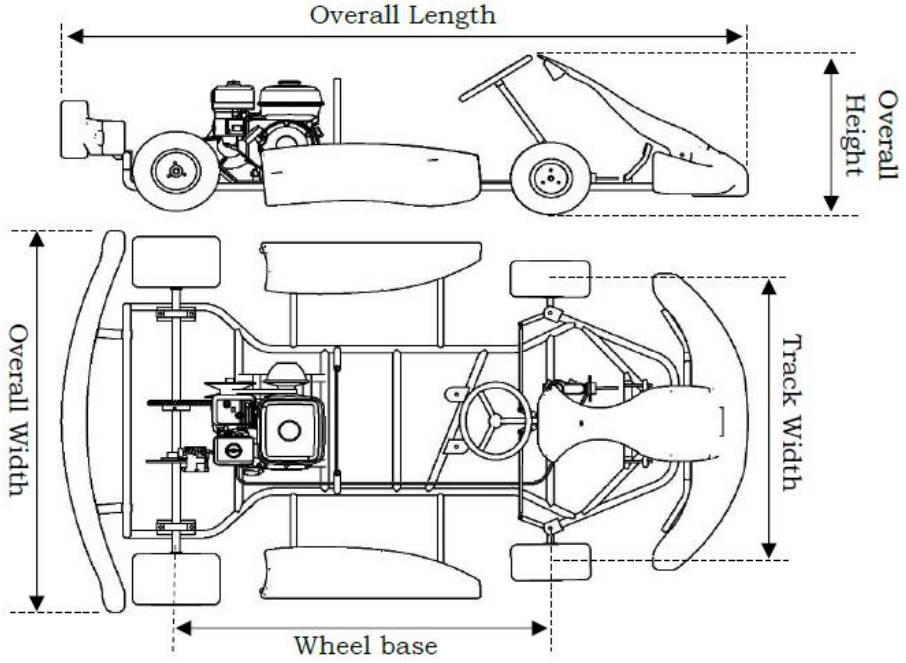
D. REGISTRATION

D.1	Registration Dates	Teams must register for each Go Karting Championship-2018 they intend to enter by the specified date on the action deadline webpage.
D.2	Registration Fees	The registration fee must be paid as per the instructions provided after registering on website. Registration fees are NOT refundable or transferable.

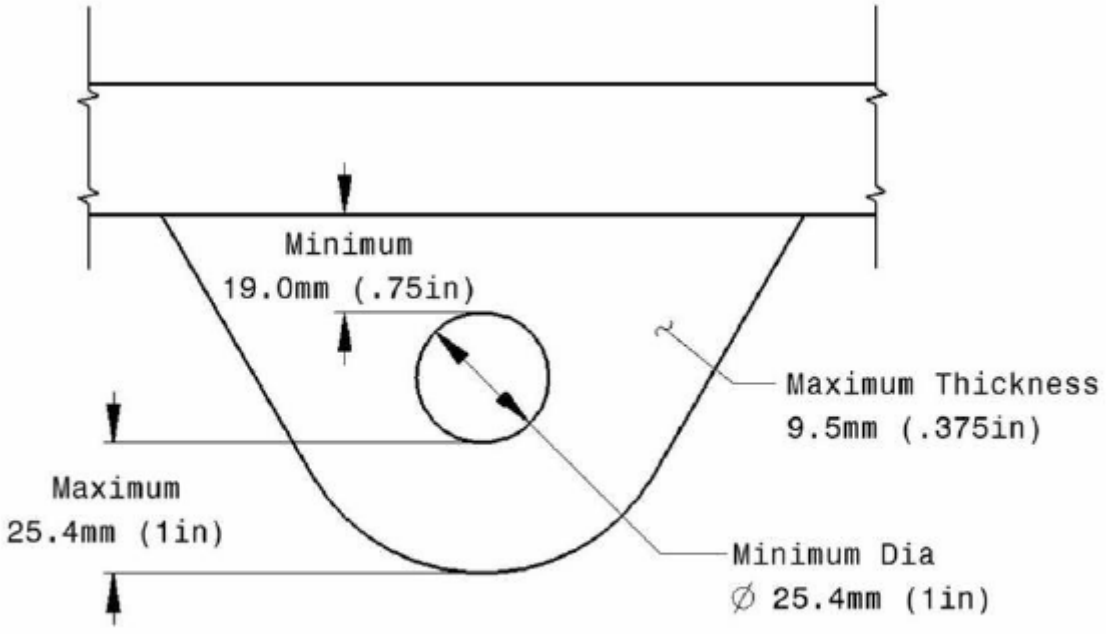
E. TECHNICAL REQUIRMENTS

E.1	Vehicle Configuration	The vehicle must have four (4) or more wheels not in a straight line. The vehicle may only use one engine of a model specified below. The vehicle must be capable of carrying one (1) person 190cm (75 in) tall weighing 113kg (250lbs)
E.2	Width	50 inches at the widest point with the wheels pointing forward at static ride height
E.3	Length	80 inches from front end to rear end.
E.4	Wheel Base and Track Width	Difference between front track and rear track width must be less than or equal to 20% of wider track (Front or Rear). Wheel base must be at least 40 inches with smaller track width (front or rear) not less than 80% of the wheelbase.
E.5	Hitch point	Each vehicle must have towing hitch points at front and rear, along longitudinal centerline with specified dimensions Towing plate Maximum thickness 9.5 mm (.375 in) Hole diameter Minimum-25.4mm (1.0 in) Radial clearance maximum from hole 25.4mm (1.0in) Hole to tube minimum clearance -19.0mm (.75in)
E.6	Ground Clearance	Minimum : 2.54 cm
E.7	Steering System	The steering system must be able to control (simultaneously) at least 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 uprights or on the rack and must prevent the tires from contacting suspension, body, or frame members during the track 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.
E.8	On Road Capability	The vehicle must be capable of safe operation over flat road including obstructions such as sharp corners. The vehicle must have adequate ground clearance and traction. Minimum allowable ground clearance is 1.25 inches on load condition.
E.9	Vehicle Ergonomic Capacity	As a prototype of a commercial product, the design intent should be to accommodate drivers of all sizes from the 95th percentile male to the 5th percentile female. The largest driver must be able to meet the chassis minimum clearances, and fit into a comfortable driving position, while wearing the entire required driver's equipment. The smallest driver must be able to comfortably reach all of the vehicle's controls.
E.10	Engine	To provide a uniform basis for the performance events, all vehicles must use the same engine. (*Go Karting Championship-2018 will provide the required engine.) Engine model and specifications will be provided in pre virtual round.

E.11	Engine restrictions	Engines used by the teams should not be older than 16 months (Teams can use one engine for two seasons). Teams must not change engine setting and should not replace original engine parts. However, teams can implement engine related innovations if in this case teams should take permission from technical committee for replacement of OEM parts for implementing innovations by providing relevant documents.



Note: Above mentioned model is only for reference, measuring points may vary from vehicle to vehicle



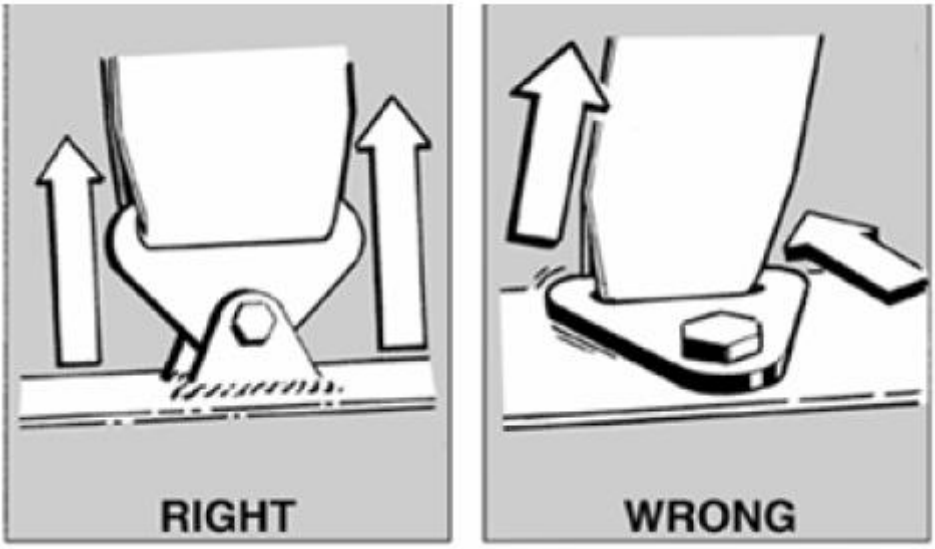
HITCH POINT

F. Cockpit

F.1	Design Objective	The cockpit must be designed to (1) protect the driver and (2) permit easy driver exit in an emergency.
F.2	Lateral Space	Minimum space is based on clearances between the driver Cockpit and a straight edge applied to any two points on the chassis. The driver's seat shall have minimum 152 mm (6 in.) clearance with side bumpers, while the driver's shoulders, torso, hips, thighs, knees, arms, elbows, and hands shall have 76 mm (3 in.) clearance. Clearances are relative to any driver selected at technical inspection, seated in a normal driving position, and wearing all required equipment.

F.3	Elements of the Chassis	The Chassis must be a space frame of tubular steel having minimum outer diameter of 25 mm wall thickness of 3mm.
F.4	Bumpers	The chassis must have front and side bumpers with padding.
F.5	Driver Exit Time	All drivers must be able to exit on either side of the vehicle within five (5) seconds. Exit time begins with the driver in the fully seated position, hands in driving position on the connected steering wheel, and wearing the required driver equipment. Exit time will stop when the driver has both feet on the ground. Driver's exit time must be demonstrated by a team driver, as selected at technical inspection.
F.6	Fire Extinguisher – Size and Location	Each vehicle must have two identical fire extinguishers with a minimum UL rating of 5 B-C. One must be mounted in the cockpit, with the top half above the side impact member on the right side of the firewall and be easily accessible by course workers.
F.7	Throttle Controls	Only mechanical foot operated throttle controls are allowed. A wide-open throttle stop must be mounted at the pedal. Controls must be designed to return to idle-stop in the event of a failure. The throttle cable must be covered (sheathed) between its forward mounting point and the firewall. Foot pedals must be positioned so as to avoid foot entrapment in any position. Your throttle must remain set at the as-passed condition, so return to idle and ensuring full throttle is achievable must be set prior to arriving at tech.
F.8	Throttle Extensions	Mechanical extensions such as thick pads or blocks may not be attached to control surfaces or the driver's feet.
F.9	Driver seat & mounting	Seat should be rigidly mounted to chassis at minimum of four points as mentioned in the above figure. Mounting of seat to floor sheet and firewall sheet is strictly prohibited.
F.10	Seat belt	Safety harness system of at least 3 points must be worn by all drivers Release Mechanism: All belts must join with a single metal-to-metal quick release lever type buckle. Shoulder Harness: The shoulder harness must be of the over-

		the-shoulder type. Vertical Location: Shoulder belt mounts must be no higher than vertically level with each driver's shoulders, and no lower than 102 mm (4 in.) vertically below each driver's shoulders. Shoulder belt mounts must be entirely on the cockpit side of the firewall, and be protected by the firewall. The shoulder belts must run directly from their mountings to the driver's shoulders, without redirection by any part of the vehicle or its equipment.



G. BRAKING SYSTEM

G.1	Foot Brake	The vehicle must have hydraulic braking system that acts on at least rear wheels and is operated by a single foot pedal. The pedal must directly actuate the master cylinder through a rigid link (i.e., cables are not allowed).
G.2	Brake Lines	All brake lines must be securely mounted and not fall below any portion of the vehicle (frame, swing arm, A-arms, etc.) Ensure they do not rub on any sharp edges. Plastic brake lines are prohibited.

H. FUEL TANK

H.1	Fuel Tank	Only a single fuel tank is permitted on the vehicle. Fuel tanks are restricted to the stock tank. No holes are allowed in the tank even if they have been repaired. Fuel pumps may not be used.
H.2	Fuel Lines	All fuel lines must be located away from sharp edges, hot engine components and be protected from chafing. Grommet ting is required where the lines pass through any member of the vehicle. Fuel lines are not allowed in the cockpit.
H.3	Fuel Tank	(A) Fuel tank must be in a sealed container that prevents fuel from leaking in the event of fuel tank failure. (B) Splash shields must prevent fuel from being poured anywhere in the cockpit area during fueling. (C) Engine must be completely enclosed and protect the driver in the event of an engine failure. Shielding must meet guarding requirements. This shielding must be made of metal. (D) All engine compartment venting must be directed away from driver area. (E) The exhaust must not exit towards the driver and must be shielded.

I. FASTENERS

I.1	Fasteners Captive	Fasteners must be made captive through the use of NYLON locknuts or safety wired bolts (in blind applications).Lock washers or thread sealants do not meet this requirement
I.2	Fastener Grade Requirements	Threaded fasteners utilized must meet or exceed either, Metric Grade 8.8 and/or AN /MS specifications.
I.3	Thread Exposure	Threaded fasteners used must have at least two (2) threads showing past the nut.
I.4	Socket Head Cap Screws	Socket head cap screws, also known as “internal wrenching bolts” or “Allen head bolts”, must meet one of the following requirements: The bolt head is clearly marked with the letters “NAS”, “12.9”, or “10.9” indicating a military/ aircraft or high-strength metric fastener. No other markings will be accepted.

J. GUARDS

J.1	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 by standers should 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.
J.2	Firewall	There must be a firewall between the cockpit and the engine and fuel tank compartment. The firewall must be metal, at least 0.50 mm (0.020 in.) Thick, and must completely separate the engine compartment and fuel tank from the cockpit and even let air pass well on to engine by providing holes/cavities. Multiple panels may be used to form the firewall but there must be no gaps between the joints. Cutouts in the firewall are allowed, but they must have grommets or boots that prevent large amounts of fuel from getting into the cockpit.
J.3	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, fiberglass, 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.
J.4	Leg and Foot Shielding	All steering or suspension links exposed in the cockpit must be shielded with metal. The shielding must prevent the driver's legs and feet from coming in contact, or becoming entangled during operation or a failure. No gaps can exist that are larger than 6.35 mm (0.25 in) are allowed. The driver's feet must be completely within the frame.

K. ELECTRICAL SYSTEM

K.1	General Electrical System Overview	The electrical system must include at least two kill switches, a brake light, and a battery power source. The kill switches must deactivate the engine ignition. The kill switches must NOT deactivate the brake light. The brake light must operate regardless of the kill switch setting. The brake light, and any reverse light and alarm, must be powered whenever the vehicle is in motion.
K.2	Batteries	Batteries must be mounted with sound engineering practice. Batteries must be able to provide power to safety items (brake light) for the duration of each event.
K.3	Non-recharging batteries	Batteries which are not recharged by an engine alternator may power only safety items (brake light) and instrumentation (driver display, data acquisition), and may not power any control or actuation function in the drivetrain and steering systems. Vehicles will be black flagged if safety equipment is not functioning. The batteries must be factory sealed (incapable of being opened or serviced) and not leak in the event of a roll over.
K.4	Recharging batteries	Only batteries which are recharged by an engine alternator may be used to power control or actuation functions in the drive-train, steering and suspension systems.
K.5	Kill Switches	Each vehicle must be equipped with two (2) easily accessible kill switches turning off the ignition. The Kill switch must not de-energize the Brake.
K.6	Kill Switch – Locations and Orientation	Cockpit Switch – The cockpit switch must be located in the front of the cockpit within easy reach of the driver with the safety harness tight. The switch may not be mounted on a removable steering wheel assembly. External Switch – The external switch must be mounted on the top end driver's right side of the vehicle.
K.7	Wiring	All wiring must be sealed, protected and securely attached.
K.8	Brake Light	The vehicle must be equipped with a red brake light that must be ISI or above rated and must be clearly visible and appear bright in daylight and mounted such that it shines parallel to the ground, not up at an angle. Requirements of brake light: 1. Brake light should travel parallel to the ground. 2. Brake light should be clearly visible up to 10 meters. 3. Brake light should be capable of glowing even when Kill switch is actuated. 4. Brake light should not be mounted on bumper.
K.9	Brake Light Switch	The brake light may be activated by mechanical or hydraulic pressure switches. Each independent brake hydraulic circuit must be equipped with a brake light switch, so that no brake, including cutting brakes may be activated without lighting the brake light.

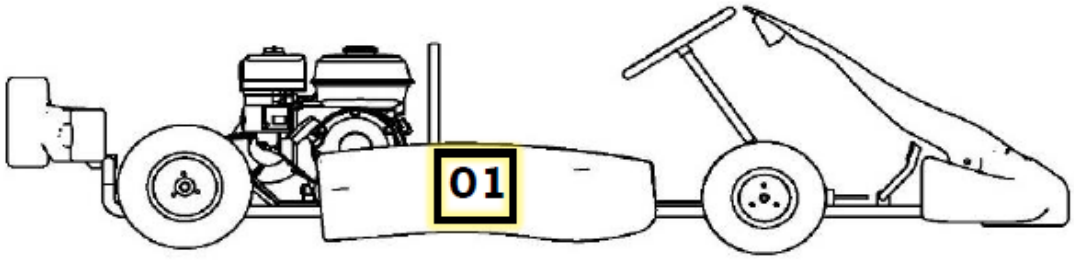
Neck Support Permitted

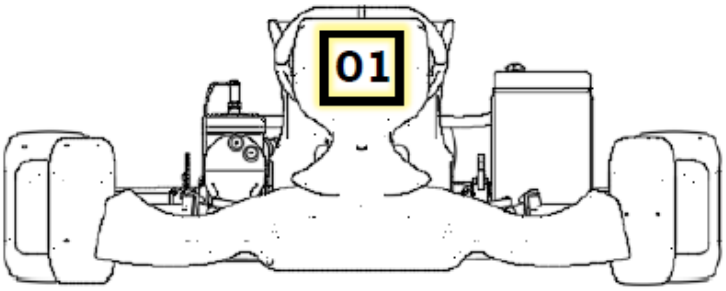
L. DRIVER EQUIPMENT

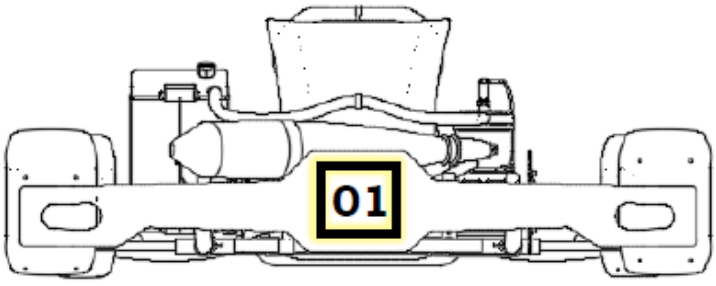
L.1	Helmets	All drivers must wear a well-fitting Full Face Helmets with an integrated (one piece composite shell) chin/face guard and a ISI rating.
L.2	Clothing	Suit: Drivers must wear single piece SFI rated full suit. Neck Support: All drivers must wear a neck support/collar. The neck support must be a full circle (360°) and SFI 3.3rated. Horseshoe collars are not allowed (see figure). Simpson, RCI, G Force, Deist or Leaf Racing Products supply neck collars that meet this requirement. Hand Gloves: Driver should wear fire proof hand gloves. Certification can be of SFI or Manufacturer certified. In case of manufacturer certified certification label should be on gloves. Drivers must wear long pants (cotton/ Nomex), socks, shoes, gloves, and a long sleeved fire resistant upper garment. The upper garment must have a factory label showing that it is ISI rating or above rating fire resistant.
L.3	Driver's License	Team members who will drive a competition vehicle at any time during a competition must hold a valid, government issued driver's license. This will be required onsite for proof.
L.4	Insurance	Individual medical and accident insurance coverage is required and is the sole responsibility of the participant

M. VEHICLE IDENTIFICATION

M.1	Number Assignment	Assigned numbers will be informed by GO KARTING CHAMPIONSHIP-2018 in pre-virtual round. It is each team's responsibility to provide its vehicle number markings. These markings include primary cutout numbers located on front and side. The numbers must be clearly visible from all sides and front of the vehicle. The numbers must remain readable throughout the competition. Numbers that are not easily read might not be scored during the endurance event.
M.2	Number Location	Three primary numbers are required to be securely affixed to the car. One on both of the sides of the frame, clearly visible in a side view. One must also be visible from a front view.
M.3	Number Size	The primary cutout numbers must be at least 102 mm (4 in) high. These have a minimum line width of 12.5 mm (1/2 in.) and 51 mm (2 in) wide. The numbers must strongly contrast with the numeral background color







N. STATIC & DYNAMIC ROUNDS

N.1	Technical Inspection (Qualifying Round)	In technical inspection kart will be inspected according to the rulebook. The kart should comply with all the points of the rulebook Kart which shows non-conformance to rulebook will penalized or may be disqualified from the event. Final decision will be taken by the technical committee head.
N.2	Weight check	After clearing technical inspection kart will be weighed to calculate score for the "Light Weight Award".
N.3	Design Evaluation Round	Best Design: In this section teams will be evaluated based on their knowledge on sub systems, design methodology followed, variation in proposed and final vehicle, Aesthetics, Ergonomics, Simulation and procedures etc. Teams scoring highest marks will be considered for "Design Award". Build Quality: In this section teams will be evaluated for their manufacturing capabilities, knowledge of manufacturing processes, weld quality, robustness of the vehicle and etc. Teams scoring highest marks will be considered for "Build Quality Award". Note: 1 Tie breaker for Best Design Award will be Build quality and Vice versa. Note: 2 Teams need to carry all necessary proofs of cad models, simulation results etc., Judges may ask teams to show results in respective software. Teams should be well prepared with their calculations and hard copies of all the reports.
N.4	Business Presentation round	In this round teams need to present their strategy to start a Go-kart manufacturing company to produce 1000 units per year. Necessary cost estimations, investment sources, break even analysis etc. should be included in presentation. Based on the presentation teams will be evaluated for 75 points, highest scoring team will be considered for "Business Plan Award".
N.5	Cost report presentation	In this round teams need to present their prototype cost. Teams can use any format for preparation of cost report. Judges will evaluate teams based on the accuracy of cost of components, detailing of cost report. Team scoring highest points will be considered for "Cost presentation Award". Note: Teams should carry original bills and hard copy of cost report to the event.
N.6	Innovation Round	Teams should present their innovation in this round. Judges will evaluate innovation based on its working, concept, feasibility, cost and effectiveness. Highest scoring team will be considered for "Innovation Award".

O. DYNAMIC ROUNDS

O.1	Eligibility for dynamic round	Teams clearing Technical Inspection (Safety check + Brake test + Skid pad) round are only eligible for dynamic rounds of the event.
O.2	Brake Test	This test is the qualifier test for all other dynamic rounds. Teams failing to clear this test will not be allowed to participate in any further dynamic rounds. In brake test Teams will be given 3 attempts. Teams should clear this test in three attempts only. Further Extension of number of attempts will not be allowed. Track detail: Complete track length in this test will be 58 meters and this is divided into two zones i.e. Accelerating Zone and Braking Zone. 50 meters of acceleration zone and 8 meters of braking zone. Start point of Acceleration Zone is called as starting Line, End point of Acceleration Zone is called as Brake line and End point of Braking Zone is called End Line. Test procedure: Driver should accelerate his kart after whistle and should continuously accelerate the vehicle till the end of the acceleration zone. Driver should cover the entire acceleration zone in maximum of 7 seconds to maintain the speed required for braking. It is advisable to design and validate the brakes at a minimum speed of 35 kmph for effective braking. Whenever front wheels reach the brake line driver should apply brakes (Panic braking). After applying the brakes rear wheels should completely lock and vehicle should slide and stop within in braking zone. Note: Vehicle should not drift more than or equal to 90 degrees in braking zone.
O.3	Skid Pad	In this test teams should complete the figure of 8 track as shown in the figure below. Track is designed such that teams having minimum turning radius of 3 meters or less can only manuer. This test is also a qualifier test for further participation in dynamic rounds.
O.4	Acceleration test	In this test karts capability to cover 50 meters at fastest rate will be tested in terms of time. Kart which completes the track in minimum time will be considered for "Acceleration Award". Track Details: In this test track will be straight length of 50 meters. Start point of the line is called as Start line and end point of the line is called End line. Test Procedure: Driver should accelerate kart as soon as whistle blows. Time elapsed between start line and end line will be measured as effective time for evaluation.
O.5	Autocross	In this test karts capability of manoeuvring and drivers skill will be tested. Kart which completes the track in least time (considering penalty) will be considered for "Auto cross Award"

		Kart hitting/crossing to hurdles will be penalized in terms of subtracting time from the time to complete autocross. The remaining time is termed as effective time for evaluation to complete autocross dynamic round. Each team will be given 2 attempts and best time will be considered for evaluation.
O.6	Endurance	In this test durability of the kart will be tested. All the karts together are allowed into the track to race for two hours. Teams which make maximum number of laps (considering penalties) will be considered for "Endurance Award". Rules & Regulations will be explained at Event site in driver's pre-endurance briefing.

TOTAL SCORE OF THE EVENT

	Event Name	Points
1	Best Design	75
2	Build quality	75
3	Business Plan	75
4	Cost Presentation	25
5	Weight Test	75
6	Innovation	75
7	Acceleration	75
8	Auto cross	75
9	Discipline and presentation	150
10	Endurance	300
11	Race	1000
	Total	2000

AWARDS

PRIZE CATEGORY	PRIZE
Overall 1st Rank	Rs.1,00,000
Overall 2nd Rank	Rs.50,000
Overall 3rd Rank	Rs.25,000
Endurance Race 1st Rank	Rs.10,000
Best Innovation Award	Rs.10,000
Best Business Plan Award	Rs.10,000
Autocross Award	Rs.10,000
Best Cost Report Award	Rs.5,000
Best Design Award	Rs.10,000
Best Acceleration Award	Rs.10,000
Best Build Quality Award	Rs.10,000
Discipline and Best Presentation Award	Rs.10,000
People's Choice Award	Rs.10,000
Runner ups and consolations worth	Rs.1,30,000
TOTAL	**RS.4,00,000**