



RULE BOOK 2023-2024

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ARTICLE NUMBER		DESCRIPTION
A	ADMINISTRATIVE REGULATIONS.	
A1	G KARTING OVERVIEW	The G KARTING competition is an initiative taken by G MOTORS to provide on hand practice and exposure to Future automotive professionals.
A1.1	G KARTING Program Objective	G KARTING 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.
A1.2	Design Subject	Each team's goal is to design and build a single-seat, on road kart, sporting vehicle whose structure contains the driver. The vehicle is to be a prototype for a reliable, maintainable, ergonomic, and economic production vehicle which serves a recreational user market, sized at approximately 100 units per month. 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 G KARTING Rules, and are subject to event-site weather and course conditions.
A1.3	Good Engineering Practices	Vehicles entered into G KARTING competitions are expected to be designed and fabricated in accordance with sound engineering practices.
A2	G KARTING RULES AND ORGANIZER AUTHORITY	
A2.1	Rules Authority	The G KARTING Rules are the responsibility of the G KARTING Rules Committee and are issued under the authority of the G KARTING. Official announcements from the G KARTING Rules Committee or the other G KARTING Organizers shall be considered part of and have the same validity as these rules. Ambiguities or questions

		concerning the meaning or intent of these rules will be resolved by the G KARTING Rules Committee during competition onsite or through mail " gkartingdirector@gmail.com " with Subject "Rule Book Doubts"
A2.2	Rules Validity	The G KARTING 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.
A2.3	Rules Compliance	By entering a G KARTING competition, the team members, faculty advisors and other personnel of the entering university agree to comply with, and be bound by, the rules and all rules interpretations or procedures issued or announced by G KARTING 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.
A2.4	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.
A2.4.1	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 G KARTING, so any perceived loopholes should be resolved in the direction of increased safety/ concept of the competition.
A2.5	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.
A2.6	Violations of Intent	The violations of the intent of a rule will be considered a violation of the rule itself. Questions about the intent or meaning of a rule may be addressed to the G KARTING

		rules committee, Technical Inspectors or G KARTING staff.
A2.7	Right to Impound	G KARTING and the other competition organizing bodies reserve the right to impound any on-site registered vehicle at any time during a competition for inspection and examination by the organizers, officials and technical inspectors.
A2.8	General Authority	G KARTING and the competition organizing bodies reserve 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 or the G KARTING series as a whole.
A2.9	Penalties	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.
A3	INDIVIDUAL PARTICIPATION REQUIREMENTS	
A3.1	Eligibility Limits	Eligibility is limited to undergraduate and graduate students to ensure this is an engineering competition rather than only race. Individual members of teams participating in this competition must satisfy the following requirements
A3.2	Age	Team members must be at least eighteen (18) years of age at the time of the competition.
A3.3	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. FMSCI licenses for the drivers will be issued on-site.
A3.4	Liability Waiver	All on-site participants and faculty are required to sign a liability waiver, MOU upon registering on-site.
A3.5	Insurance	Individual medical and accident insurance coverage is required and is the sole responsibility of the participant.
A4	FACULTY ADVISOR	

A4.1	Faculty Advisor Status	Each team is expected to have a Faculty Advisor appointed by the Team. The faculty advisor is expected to accompany the team to the competition.
A4.2	Responsibilities	Faculty Advisors are expected to advise their teams on general engineering and engineering project management theory.
A4.3	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.
A5	ELIGIBILITY – VEHICLES	
A5.1	Student Created	The vehicle and associated documentation must be conceived, designed and fabricated by the team members without direct involvement from the professional engineers, faculty or professionals in the on-road and racing communities.
A5.2	Professional Fabrication Limits	Vehicles which have been professionally fabricated may be disqualified from the competition.
A5.3	Kit Vehicles Prohibited	- Vehicles fabricated from a kit or published designs are ineligible to compete.
A5.4	Prefabricated Subassemblies	These rules do not exclude the use of prefabricated or modified sub-assemblies
A6	REGISTRATION	
A6.1	Registration Dates	Teams must register for each G KARTING competition they intend to enter by the specified date on the action deadline.
A6.2	Registration Fees	The registration fee may be paid online by debit card, UPI at the time of registration. or may be paid offline by bank

		challan. Registration fees are NOT refundable or transferable.
A6.3	International Participation – Vehicle Shipping/India Customs	G KARTING organizers strongly recommend international teams ship their vehicles early in order to allow enough time to compensate for any delays that may occur in clearing Indian Customs. Please check with the Indian Customs Service concerning the regulations governing the temporary importation of vehicles. You may want to consider using the services of a freight forwarder who is familiar with the international shipping of racing vehicles.
	Vehicle Shipping	Vehicle shipments by commercial carriers must comply with the laws and regulations of nations from which, and to which, the vehicle is being sent. Teams are advised to consult with their shipping company or freight forwarder to be sure their shipment fully complies with all relevant customs, import/export and aviation shipping requirements. Shipments must be sent with the participating university listed as the sending party. The competition organizers, nor the competition sites can be listed as the receiving party for your vehicle.
B	TECHNICAL REQUIREMENTS	
B1	GENERAL DESIGN REQUIREMENTS	
B1.1	Vehicle Configuration	The vehicle must have four (4) or more wheels not in a straight line.
B1.1.1		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 113 kg (250lbs).
B1.1.2	Maximum Vehicle Dimensions	Width: 50 inches at the widest point with the wheels pointing forward at static ride height. Length: 80 inches from front end to rear end.
B1.1.3	Wheelbase and Track Width	Difference between front track and rear track width must not be less than 80% 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. For example : If rear track width is wider and is 50 inches then the front track width must not be less than 40 inches (80 % of wider track). If the wheelbase is 50 inches then

		the smaller track width (front or rear) must not be less than 40 inches.
B1.1.4	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)
B1.1.5	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.
B1.2	On Road Capability	
B1.2.1		The vehicle must be capable of safe operation over flat roads including obstructions such as sharp corners.
B1.2.2		The vehicle must have adequate ground clearance and traction. Minimum allowable ground clearance is 1.25 inches on load condition.
B1.3	Vehicle Capacity Ergonomic	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.
B2	REQUIRED ENGINE	
B2.1		Engine Requirement and Restrictions

		To provide a uniform basis for the performance events, all vehicles must use the same engine: Four cycle, air cooled, 150 cc, OHV Intake Model. (* G KARTING will provide the required engine.)
B2.1.1	Replacement Parts	Only Original Equipment replacement parts may be used.
B2.1.2	Piston Rings	Only standard size original piston rings may be used.
B2.1.3	Intake Ports	No cleaning or removing of aluminum flashing from intake or exhaust ports may be done
B2.1.4	Valves	A. Valve Clearance Any valve clearance setting between tappet and valve stem – intake and exhaust may be set. B. Valve Lapping Valves may be lapped to ensure proper sealing. Intake angle must remain at 45 degrees; exhaust angle must remain at 45 degrees.
B2.1.5	Shafts and Rods	Camshaft, crankshaft, connecting rod and flywheel must not be altered or modified
B2.1.6	Spark Plugs	Must use standard spark plug Only
B2.1.7	Armature	Any armature air gap setting is allowed. No slotting or elongating of armature mounting holes to increase or retard ignition timing.
B2.1.8	Flywheel Rotation	No flywheel rotation to advance or retard timing is permissible.
B2.1.9	Carburetor	A. Carburetor Re-jetting – Prohibited This is a fixed carburetor, re-jetting of the carburetor is prohibited. B. Idle Speed Any idle speed adjustment is allowed. C. Carburetor Float Carburetor float is non-adjustable and may not be readjusted. D. Carburetor Venturi Modification of carburetor ventures is prohibited.
B2.1.10	Air Cleaner	The air intake may be relocated, but standard parts must be used to relocate the air filter.
B2.1.11	Exhaust System	A. Muffler Relocation If the vehicle design requires an exhaust system

		<p>reconfiguration to keep it from impinging on part of the vehicle, the re-routing must be done using tubing having an ID compatible with exhaust pipe .Any remote mounted exhaust system must use the original muffler and must be securely mounted so that it does not vibrate loose during the competition.</p> <p>B. Muffler Support Support for the exhaust pipe and muffler are strongly recommended.</p> <p>C. Exhaust Pipe Exhaust pipe may not protrude inside of the exhaust port, so as to alter port configuration.</p> <p>D. Exhaust Pipe – Length Any exhaust pipe length is allowed, however pipe length may not be adjustable.</p> <p>E. Exhaust Pipe – Holes & Tubes No extra holes or tubes are allowed in the exhaust pipe.</p> <p>F. Exhaust System – Durability Required The exhaust pipe and muffler must be completely intact and operational throughout the competition. Any vehicle found to have a loose or leaking exhaust system will be removed from competition until the issue can be corrected.</p>
B2.1.1 2	Starter	The Recoil starter rope may be extended to accommodate the driver starting the engine while seated.
B2.1.1 3	Alternator	The engine may be fitted with an alternator to generate electrical energy.
B2.1.1 4	Engine Governor	<p>Each engine is equipped with a governor. Each governor will be set at competition to a 3,500 rpm or lower maximum speed. Random inspection of the governor may be conducted at any time. Any attempt to defeat the engine governor so as to increase the engine speed is grounds for immediate disqualification.</p> <p>GOVERNOR SETTING NOT TO EXCEED 3500 RPM.</p> <p>The governor operation must remain free of obstructions at all times. Governor area must be shielded from debris. The stock configuration of the fuel tank mounted to the engine is acceptable for debris management. However, if the fuel tank is to be remote mounted, a debris shield covering the exposed governor area is required.</p>
B2.1.1 5	Hybrid Electric Power Systems	Hybrid electric power systems are specifically prohibited.

B2.1.1 6	Energy Storage Devices Used for Propulsion	Hydraulic accumulators are the only type of stored energy device that may be incorporated into the vehicle for propulsion purposes. Hydraulic power systems must be properly shielded and documentation of the shielding made available for review. Flywheels and similar types of rotating inertia storage devices are prohibited
B3	ELECTRICAL SYSTEM	
B3.1	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.
B3.2	Batteries	
B3.2.1		Batteries must be mounted with sound engineering practice.
B3.2.2	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 drive-train and steering systems.
B3.2.2. 1		Batteries must be able to provide power to safety items (brake light) for the duration of each event.
B3.2.2. 2		Vehicles will be black flagged if safety equipment is not functioning.
B3.2.2. 3		The batteries must be factory sealed (incapable of being opened or serviced) and not leak in the event of a roll over.
B3.2.3	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.
B3.3	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.
B3.3.1	Kill Switch – Locations	(A) Cockpit Switch – The cockpit switch must be located in

	and Orientation	the front of the cockpit within easy reach of the driver with the safety harness tight. The switch may not be mounted on a removable steering wheel assembly. (B)External Switch – The external switch must be mounted on the top end driver's right side of the vehicle.
B3.3.2	Wiring	All wiring must be sealed, protected and securely attached.
B3.4	Brake Light	
B3.4.1		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.
B3.5	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.
B4	VEHICLE IDENTIFICATION	
B4.1	Number Assignment	Assigned numbers will be mailed for each team through official mail. 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.
B4.1.1	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.
B4.1.2	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.
B5	Cockpit and Throttle	
B5.1	Design Objective	The cockpit must be designed to

		<ol style="list-style-type: none"> 1. protect the driver and 2. permit easy driver exit in an emergency.
B5.1.1	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 a 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.
B5.2	Chassis Structure	
B5.2.1	Elements of the Chassis	The Chassis must be a frame of tubular steel having minimum outer diameter of 25 mm wall thickness of 3mm.
B5.2.2	Bumpers	The chassis must have front and side bumpers.
B5.3	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.
B5.3.1	Firewall	There must be a firewall between the cockpit and the engine and fuel tank compartment. The firewall must be metal, at least 1.0 mm Thick, and must completely separate the engine compartment and fuel tank from the cockpit.
B5.4		<p>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.</p> <p>A. Fuel tank must be in a sealed container that prevents fuel from leaking in the event of fuel tank failure.</p> <p>B. Splash shields must prevent fuel from being poured anywhere in the cockpit area during fueling.</p> <p>C. Engine must be completely enclosed and protect the driver in the event of an engine failure. Shielding must</p>

		<p>meet guarding requirements. This shielding must be made of metal.</p> <p>D. All engine compartment venting must be directed away from the driver area.</p> <p>E. The exhaust must not exit towards the driver and must be shielded.</p>
B5.5	Belly Pan	<p>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. They must be designed to prevent debris and foreign object intrusion into the driver compartment. Expanded metal, fabric, or perforated panels are not allowed.</p>
B5.6	Leg and Foot Shielding	<p>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 that are larger than 6.35 mm (0.25 in) are allowed. The driver's feet must be completely within the frame.</p>
B5.7	Fire Extinguisher – Size and Location	<p>Each vehicle must have two identical fire extinguishers with a minimum UL rating of 500 gm/liter - 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.</p>
B5.8	Throttle Controls	<p>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 returning to idle and ensuring full throttle is achievable must be set prior to arriving at tech.</p>
B5.9	Throttle Extensions	<p>Mechanical extensions such as thick pads or blocks may not be attached to control surfaces or the driver's feet.</p>
B6	BRAKING SYSTEM	
B6.1	Foot Brake	<p>The vehicle must have a hydraulic braking system that</p>

		acts on both 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 / wire are not allowed).
B6.2	Brake Lines	All brake lines must be securely mounted and not fall below any portion of the vehicle frame. Ensure that they do not rub on any sharp edges. Plastic brake lines are prohibited.
B7	FUEL TANK	
B7.1	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.
B7.2	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.
B8	FASTENERS	
B8.1		Fasteners in the driver restraint systems and fuel system mounting must meet the following guidelines.
B8.2	Fasteners Captive	Fasteners must be made captive through the use of NYLON locknuts, cottered nuts or safety wire bolts (in blind applications). Lock washers or thread sealants do not meet this requirement.
B8.3	Fastener Grade Requirements	Threaded fasteners utilized must meet or exceed either Metric Grade 8.8 and/or AN/MS specifications.
B8.4	Thread Exposure	Threaded fasteners used must have at least two (2) threads showing past the nut.
B8.5	Socket Head Cap Screws	
B8.5.1		Socket head cap screws, also known as “internal wrenching bolts” or “Allen head bolts”, must meet one of the following requirements:
B8.5.2		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.
B9	GUARDS	
B9.1	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 bystanders 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.
B10	DRIVER EQUIPMENT	
B10.1	Helmets	All drivers must wear well-fitting Full Face Helmets with an integrated (one piece composite shell) chin/face guard and an ISI rating.
B10.1.1	Clothing	Drivers must wear long pants (cotton/ Nomex), socks, shoes, gloves, and a long sleeved fire resistant single piece suit.
B10.1.2		The single piece suit must have a factory label showing that it is ISI rating or above rating fire resistant.
C	DYNAMIC EVENTS-STATIC EVENTS	
C1	SCORING	
	SCORE SUMMARY-STATIC EVENTS/ 300 points	Design Evaluation-150 Cost Report-15 Prototype Cost-85 Sales Presentation-50
	DYNAMIC EVENTS/ 700 points	Acceleration-120 Maneuverability-180 Endurance-400
C2	TECHNICAL INSPECTION	
C2.1	Technical Inspection – Pass/Fail	All G KARTING vehicles must pass a technical inspection before they are permitted to operate under power.
C2.1.1		The inspection will determine if the vehicle satisfies the requirements and restrictions of the G KARTING rules.

C2.1.2		If vehicles are not ready for technical inspection when they arrive at the inspection site, they will be sent away.
C2.1.3		Any vehicle may be re-inspected at any time during the competition and correction of any non-compliance will be required.
C2.2	Technical Inspection	Technical inspection will consist of four (4) separate parts as follows
C2.2.1		Engine inspection and governor setting- Governor Setting Check G KARTING Technical Representatives will set the governors of all vehicles.
C2.2.2	Technical Inspection	Each vehicle will be inspected to determine if it complies with the requirements and restrictions of the G KARTING rules. This inspection will include an examination of the driver 's equipment including helmet, a test of driver exit time and to ensure that all drivers meet the requirements of the rules.
C2.2.3	Kill switch and dynamic brake testing	Both the external and cockpit kill switches will be tested for functionality. If both switches pass the test then the vehicle will be dynamically brake tested. Each vehicle must demonstrate its ability to lock wheels and come to rest in an approximately straight line after acceleration run specified by the inspectors. If a vehicle fails to pass any part of the inspection it must be corrected/modified and brought into compliance with the rules before it is permitted to operate.
C2.3	Inspection Stickers	
C2.3.1		A multi-part inspection sticker will be issued in sections to each vehicle as each of the three parts of technical inspection is completed .The inspection sticker must remain on the vehicle throughout the competition. Vehicles without all parts of the inspection sticker may not be operated under power.
C2.3.2		Any or all parts of the inspection sticker may be removed from any vehicle that has been damaged or which is reasonably believed may not comply with the rules.
C2.4	Technical Inspection Sheet – Pre-inspection Required	

C2.4.1		Once a vehicle has passed technical inspection its configuration may not be modified. All accessory, Components such as roofs, wings, bumpers, etc. are considered part of the configuration and must remain on the vehicle at all times.
C2.4.2		Approved vehicles must remain in “as-approved” condition throughout the competition. Any repairs of a part that is not identical as the broken part must be approved prior to the repair.
C2.4.3		Non-identical parts not approved will be subject to an appropriate performance penalty.
C2.4.4		Minor adjustments permitted by the rules and normal vehicle maintenance and tuning are not considered modifications.
C3	ENGINEERING DESIGN EVENT	
C3.1		Engineering Design Event Overview and Objective
C3.1.1		The objective of the engineering design event is to evaluate the engineering effort that went into the design of the vehicle and how the engineering meets the intent of the market, as detailed in the Program Objective A1.1 and the Design Subject A1.2. Students will be judged on the creation of design specifications and the ability to meet those specifications, computer aided drafting, analysis, testing and development, manufacturability, serviceability, system integration and how the vehicle works together as a whole. Each of these parts of the engineering product development cycle will be judged within the following subsystems: Steering, Drivetrain/ Powertrain, Chassis and Ergonomics.
C3.1.2		The vehicle that illustrates the best use of engineering to meet the design goals and the best understanding of the design by the team members will win the design event. Comment: Teams are reminded that G KARTING is an engineering design competition and that in the Engineering Design Event; teams are evaluated on their design. Components and systems that are incorporated into the design as finished items are not evaluated as a participant designed unit, but are only assessed on the

		team's selection and application of that unit. For example, teams that design and fabricate their own shocks are evaluated on the shock design itself as well as the shock's application within the suspension system. Teams using commercially available shocks are evaluated only on selection and application within the suspension system.
C3.1.3		The engineering design event consists of two parts: Design Evaluation and an unscored Design Report that will be used as a part of the design evaluation
C3.2	Design Report – Required Submission	
C3.2.1	Design Report	The design evaluation judging will start with submission, before the event, of a Design Report. The Design Report will be reviewed by the design judges who will ultimately judge the team and vehicle at on-site Design Evaluation.
C3.2.2		The Design Report must not exceed eight (8) pages, consisting of not more than four (4) pages of text, three (3) pages of drawings and one (1) optional page containing content to be defined by the team (photo's, graphs, etc.). All pages must be either 8 ½" x 11" or A4.
C3.2.3		The Design Report should contain a brief description of the vehicle with a review of your team's design objectives, vehicle concepts, and a discussion of any important design features. Note or describe the application of analysis and testing techniques (FEA, part/system/vehicle testing, etc.). Evidence of this analysis and back-up data should be brought to the competition and be available, on request, for review by the judges.
C3.2.4		The Design Report will be used by the judges to sort teams into the appropriate design groups based on the quality of their review.
C3.3	Design Specification Sheet – Required Submission	
C3.3.1	Design Specification Sheet	A completed G KARTING Design Specification Sheet must be submitted.
C3.3.2		The design judges realize that final design refinements

		and vehicle development may cause the submitted figures to diverge slightly from those of the completed vehicle. For specifications that are subject to tuning, an anticipated range of values may be appropriate.
C3.3.3		The Design Report and the Design Spec Sheet, while related, are independent documents and must be submitted as two (2) separate files
C3.4	Design Report - Vehicle Drawings	
C3.4.1		The Design Report must include one set of three (3) view drawings showing the vehicle, from the front, top, and side.
C3.4.2		Each drawing shall appear on a separate page. The drawings can be manually or computer generated.
C3.4.3		Photos should be placed on the optional page and will not be counted as drawings.
C3.5	Design Report and Design Spec Sheet Formats	
C3.5.1		The Design Report must be submitted electronically in Adobe Acrobat Format (PDF). The document must be a single file (text, drawings and optional content are all inclusive). The design report file must be named as follows: Vehicle #_collage name .The maximum size for the file is 5 megabytes.
C3.5.2		Design Spec Sheets must be submitted electronically in Microsoft Excel® Format (*.xlsx file). The format of the Spec Sheet MUST NOT be altered. Similar to the Design Report, the Design Spec Sheet file must be named as follows: Vehicle #_collage name (full name).
		WARNING: Failure to exactly follow the above submission requirements may result in exclusion from the Design Event. If your file is not submitted in the required format then it cannot be made available to the design judges and your team will be excluded from the Design Event.
C3.5.3		Design reports must be submitted to the individual/address listed on the Action Deadlines page on the G KARTING website. Reports must be received by the due date listed

		in the Action deadlines. Design Report submission will be acknowledged either on the competition website or by email. Teams should have a printed copy of this acknowledgement available at the competition as proof of submission in the event of discrepancy.
C3.6	On-Site Design Evaluation	
C3.6.1		The design judges will evaluate the engineering effort based upon the team's Design Report, responses to questions, and an inspection of the car.
C3.6.2		The design judges will inspect the car to determine if the design concepts are adequate and appropriate for the application (relative to the objectives set forth in the rules).
C3.6.3		It is the responsibility of the judges to deduct points if the team cannot adequately explain the engineering and construction of the car.
C3.6.4	Support Material	Teams may bring with them to Design Evaluation any photographs, drawings, plans, charts, example components, or other materials that they believe are needed to support the presentation of the vehicle and the discussion of their development process. Use of laptop or notebook computers, posters, and binders is allowed, but projectors may not be used.
C3.7	Judging Sequence	
C3.7.1		Design Evaluation is typically organized as follows: 1. Initial judging of all vehicles 2. Final judging ranking the top 3 to 10 vehicles
C3.8	Design Finals	
C3.8.1		The purpose of Design Finals (DF) is to reward, and call attention to, those vehicles judged to have the best engineering designs. DF are held after the conclusion of Design Evaluation so that the finalists may be chosen, and then judged. The number of finalists may vary from as few

		as three to as many as ten, as determined by the number of entries and the results of Design Evaluation.
C3.8.2	Design Finals Presentation- Format	<p>One or more team members may make the presentation to the judges. The presentation itself is limited to a maximum of six (6) minutes.</p> <p>Following the presentation there will be approximately three (3) minutes for questions from the judges.</p> <p>Only the judges are permitted to ask questions. Any team member on the presentation floor may answer the questions even if that member did not speak during the presentation itself.</p> <p>Equipment-It is recommended that teams bring a laptop, binders or posters to show documentation for the engineering they have completed, but no projectors will be allowed.</p>
C3.9	Scoring	
C3.9.1		The engineering design event will be worth 150 points at the competitions.
C3.9.2		The judges may at their discretion award the highest placing team less than the maximum noted above.
C4	COST EVENT- REVIEW SUBMISSION PROCEDURE	
C4.1		Cost consists of two related sections: Cost Report and Prototype Cost. The cost report provides all the background information to verify the vehicle's actual cost. The prototype cost is the actual cost and the points and the points related there to.
C4.2	Cost Report	The Cost Report may contain a maximum of three sections.
C4.2.1	Report Section 1 – Overview (Optional)	The optional overview is intended to give each team the opportunity to point out, and briefly comment on, any design features or fabrication processes that are innovative or are expected to result in significant cost savings. Teams may also use the overview to explain items or processes that might appear to be discrepancies within the report. The overview section is limited to a

		maximum of four (4) pages and is optional. This should be included as part of the Cost Documentation .pdf file.
C4.2.2	Report Section 2 – Costing Sheets	The core of the report is the series of costing sheets. This section must contain the one-page summary sheet broken up into the individual subsystems. Each subsystem needs an individual sub-assembly sheet . Note that Vehicle Assembly Labor cost is for the labour it takes to assemble a subassembly to the frame. All fabricated parts on the sub-assemblies sheets require a Note that the sub-system assembly time is the time it takes to assemble all the parts in that assembly together.
C4.2.3	Report Section 3 – Cost Documentation	This section includes copies of receipts, invoices, price tags, catalogue pages, on-line prices, or other documentation, to substantiate the costs of the parts and materials of any item . Cost documentation must be at full retail Indian prices. The use of foreign receipts, purchases from discount sites such as Craig's List, EBay or junk yards are not allowed. The report is expected to be comprehensive, well documented, truthful and accurate.
C4.2.4	Prototype Cost – 85 points	<p>Prototype cost is scored on the cost, as corrected by the judges, to produce the finished vehicle brought to the competition. Prototype cost score will be calculated as follows:</p> $\text{Prototype Cost} = 85 \text{ points} \times \{(C_{\text{max}} - C_{\text{yours}}) / (C_{\text{max}} - C_{\text{low}})\}$ <p>Where:</p> <p>C your Vehicle cost, as corrected</p> <p>C low lowest vehicle cost, as corrected</p> <p>C max highest vehicle cost, as corrected</p>
C5	SALES PRESENTATION EVENT	
C5.1	Presentation Objective –	The objective of the Presentation is for the team to convince the “executives” of a hypothetical manufacturing company to purchase the team’s G KARTING vehicle design and put it into production at the rate of 100 units per month.
C5.1.1		For the purpose of the presentation, teams are to assume that the judges are to be a mixed group of corporate executives who may have experience in marketing, production and finance as well as engineering

C5.2	Presentation – Format	One or more team members may make the presentation to the judges. The presentation itself is limited to a maximum of ten (10) minutes.
C5.2.1		Following the presentation there will be an approximately five (5) minute question period.
C5.2.2		Only the judges are permitted to ask questions. Any team member on the presentation floor/stage may answer the questions even if that member did not speak during the presentation itself.
C5.3	Presentation – Scoring	
C5.3.1		The presentation event will be scored based on such categories as (1) The content of the presentation, (2) The organisation of the presentation, (3) The effectiveness of the visual aids, (4) The speaker's delivery, and (5) The team's responses to the judge's questions. The team's score will be the average of the individual judge's scores.
C5.3.2		The team that makes the best presentation will receive the highest score regardless of the finished quality of their actual vehicle.
D	DYNAMIC EVENTS	The dynamic events are intended to determine how the G KARTING vehicles perform under a variety of conditions. Note that the organizers may modify the dynamic events to address local conditions, weather or resources
D1	ACCELERATION	
D1.1	Objective	Acceleration is measured as the time to complete a given distance flat, straight course from a standing start.
D1.1.1		The choice of course length is at the organizer's discretion.
D1.2	Procedure	Each vehicle may make two (2) attempts.
D1.2.1		Scoring will be based on the better of the two attempts. Timing may be done using either electronic systems or stop watches.

D1.3	Penalties	The organizer may modify the penalties imposed for different violations to account for differences in the length or design of specific event courses.
D1.3.1		False Start or Stall at Start First -Rerun at end of line Second – Run DNS
D1.3.2		Driving off Course Run DNF
D1.4	Scoring	Vehicles with acceleration times that are more than 1.5 times that of the fastest vehicle will not receive a score for this event.
D1.4.1		Teams attempting the event, but exceeding the time limit will be classified as “Excess Time”.
D1.4.2		The following equation will be used for the acceleration score: $\text{Acceleration Score} = 100 \text{ points} \times \{(T_{\text{Longest}} - T_{\text{Yours}}) / (T_{\text{Longest}} - T_{\text{Shortest}})\}$ Where: T-shortest fastest time by any vehicle T-yours time for the vehicle to be scored T-longest the lesser of: a) slowest time by any vehicle; b) 1.5Tshortest
D2	MANEUVERABILITY EVENT 180 points	
D2.1	Objective	Maneuverability is designed to assess each vehicle’s handling ability over typical race terrain. The course may consist of a variety of challenges at the organizer’s option, possibly including tight turns, pylon maneuvers.
D2.2	Procedure	Each vehicle may make two (2) runs with the best time including penalties, counting for score.
D2.3	Penalty Default Values	The organizer may modify the penalties imposed for different violations to account for differences in the length or design of specific event courses.
D2.3.1		Obstacle/Pylon moved 2 seconds
D2.3.2		Missed gate* 10 seconds
D2.3.3		Excessive Driving Off Course Run DNF
D2.3.4		False Start First - Rerun at end of line Second - Run DNS

		*Missed gate is when 2 or more wheels are outside the gate.”
D2.4	Time Limit	Only vehicles that complete the maneuverability course within a time not exceeding 2.5 times that of the fastest vehicle will receive a score. If a vehicle is on the course for a time that exceeds 2.5 times the fastest time recorded to that point then the attempt may be declared over and the vehicle may be removed from the course and scored as “Excess Time
D2.5	Scoring	Manoeuvrability scoring is based on the vehicle’s time through the course including any penalties. $\text{Maneuverability Score} = 180 \text{ points} \times \{(T_{\text{Longest}} - T_{\text{Yours}}) / (T_{\text{Longest}} - T_{\text{Shortest}})\}$ Where: T-shortest fastest time by any vehicle T-yours time for the vehicle to be scored T-longest the lesser of: a) slowest time by any vehicle; b) 2.5Tshortest
D3	ENDURANCE 400 Points	
D3.1	Endurance – Objective	General: The endurance event assesses each vehicle’s ability to operate continuously and at speed over tarmac containing tight turns in all weather conditions.
D3.2	Endurance – General Description	Endurance may be run for either time or distance. Endurance events for time usually run for given hours. Endurance events for distance continue until at least one car has gone the specified distance.
D3.2.1		Endurance will be run as either A. A single given hour race, B. A predetermined and published distance, or as C. Elimination heats followed by a final in which the total time of one elimination heat plus the final is given hours. The organizer will announce the structure of the event prior to the start.
D3.2.2		There should be a minimum of TWO and a maximum of FOUR drivers who will complete the endurance race. The drivers will have to drive their Go-Kart for the equal interval of time
D3.2.3	Determining the winner	A. The team that completes the distance of the

	of the endurance race.	<p>competition first, or the greatest distance in the time set for the competition will be declared the winner</p> <p>B. In competitions of a given distance, the checkered flag will be given first to the leading car, then to the other finishers as they cross the finish line.</p> <p>C. In competitions of a timed length, the checkered flag will be given first to the leading car as it crosses the finish line at or at the expiration of the specified duration, then to the other finishers as they cross the finish line.</p> <p>D. If the leading car is not running at the expiration of the time limit, the checkered flag will be given to the next highest running car in the same manner.</p>
D3.3	Endurance – Starting	
D3.3.1		The starting grid for endurance will be based on each team's performance in a previous dynamic event, or set of dynamic events, to be determined by the organizer.
D3.3.2		All vehicles will be considered to have begun the race simultaneously at the time when the starter releases the first vehicle onto the course regardless of their actual position in the grid.
D3.4	Endurance Command Flags –	Command flags are just that – flags that the competitor must immediately obey without question.
D3.4.1	Green Flag	<p>1. At a starting line or when reentering the course: Your run or session has started; enter the course under the direction of the starter. (NOTE: If you stall the vehicle, restart and await another green flag as the opening in traffic may have closed.)</p> <p>2. While running on the course: Course is clear, proceed.</p>
D3.4.2	Yellow Flag, Steady	Danger, SLOW DOWN, be prepared to take evasive action, something has happened beyond the flag station. NO PASSING, unless directed by the course workers.
D3.4.3	Yellow Flag, Waved	Great danger, SLOW DOWN, evasive action is likely to be required, BE PREPARED TO STOP, something has happened beyond the flag station. NO PASSING, unless Directed by the course workers.
D3.4.4	Red Flag	Come to an immediate safe and controlled stop on the course. Pull to the side of the course as much as possible

		to keep the course open. Follow course worker directions. NO PASSING.
D3.4.5	Black Flag, Furled and Pointed	Warning, the officials are watching this vehicle's driving – obey the event rules.
D3.4.6	Black Flag, Displayed	1. Pull into the penalty box for a discussion with the Director of Operations or other official concerning an incident. A time penalty may be assessed for the incident. 2. Pull into the penalty box for a mechanical inspection of the car; something has been observed that needs closer inspection.
D3.4.7	White Flag	In specified-distance endurance events, the white flag will be displayed to the leader as the leader begins the final lap.
D3.4.8	Checkered Flag	The run or session has been completed. Exit the course at the first opportunity.
D3.5	Endurance Event – Penalty Default Values	
D3.5.1		The organizer may modify the penalties imposed for different violations to account for differences in the length or design of the course. Note that all time penalties are enforced from when the vehicle is in the black flag area, i.e. the time spent being towed back to the pits does NOT count towards the penalty.
D3.5.2		Passing under a Yellow Flag First time = warning Subsequent times= discretionary penalties
D3.5.3		Failure to stop for Black Flag 10 minutes
D3.5.4		Leaving course and advancing 5 minutes
D3.5.5		Speeding in pit area First time = 5 minutes Second time = 20 minutes
D3.5.6		Aggressive driving First time = 10 minutes Second time = Disqualification

D3.6	Endurance – Scoring	
D3.6.1		General: The endurance event score is determined by a. the number of laps each team completes during the endurance final and b. the finish order of teams at the end of the event.
D3.6.2		“Scored laps” are the number of full laps actually completed during the endurance event final. Only full laps count, partial laps do not count for score. A vehicle must cross the counting/timing line under its own power for a lap to be counted.
D3.6.3		“Finish order” is the sequence in which vehicles cross the finish line after the lap scoring period has ended. Finish order determines the ranking of teams completing the same number of laps. For example, if the top four teams finish with the same number of laps, then they will be ranked 1st to 4th based on their finish order
D3.6.4		Endurance scoring is based on number of laps the vehicle completes in the allowed time: Endurance Score= 400 points $\times \{(Lyours - Llowest) / (Lhighest - Llowest)\}$ Where: L-highest highest number of laps completed by any vehicle, Lyours number of laps completed by the vehicle to be scored, L-lowest lowest number of laps completed by any vehicle
D4	COMPETITION PROCEDURES AND REGULATION – GENERAL	
D4.1		General Meetings All team members identified as captains or drivers and all faculty advisors MUST attend all meetings as designated; Attendance at meetings is mandatory. Failure to attend meetings can result in disqualification of members or the entire team.
D4.2		Tie-breakers Tie-breakers for dynamic events will be the second best run time or score for the given tied event. If both scores for tied teams in the event are equal then the tie remains.
D4.3		Pre-inspection Operation Prohibited

		Vehicles may not be started or driven prior to passing technical inspection, except as required as part of the inspection process itself.
D4.4		Engine governors are subject to check and resetting.
D5	RULES OF CONDUCT	
D5.1		All G KARTING participants can be proud of the excellent sportsmanship and cooperation among teams that are two of the hallmarks of the series. Good conduct and compliance with the rules and the official instructions are expectations and requirements for every team member.
D5.1.1		An incident of unsportsmanlike conduct, the organizer or G KARTING Staff is authorised to impose an appropriate penalty.
D5.1.2		Unsportsmanlike conduct can include arguments with officials, disobedience of official instructions and the use of abusive or threatening language to any official or other participant. Depending on the seriousness of the infraction the penalty for such actions can range from a deduction of up to fifty percent (50%) of the team's points to expulsion of the entire team. Penalties of this type will only be imposed after a complete review of the incident by the organizer and G KARTING staff.
D5.2	Alcohol and Illegal Material	Alcoholic beverages, firearms, weapons of any type and illegal materials are prohibited at G KARTING sites during the competition. The penalty for violation of this rule is the immediate expulsion of the entire team, not just the individual(s) involved. This rule applies to team members, advisors and any individuals working with the team on-site.
D5.3	Smoking – Prohibited	Smoking is prohibited in all competition areas.
D5.4	Parties	Disruptive parties either on or off-site must be prevented by the faculty advisor or team captain.
D5.5	Trash Clean-up	Clean-up of trash and debris is the responsibility of the teams. Please make an effort to keep your paddock area clean and uncluttered. At the end of the day, each team must clean their work area.
D5.6	Site Condition	Please help the organizers keep the site clean. The sites

		used for G KARTING are generally private property and should be treated as such. Competitors are reminded that they are guests of the owners. All trash should be placed in the receptacles provided. Glass is not allowed on the grounds. Failure to clean the premises will result in an unsportsmanlike conduct penalty. Competitors are encouraged to police their areas after meals.
D6	SPECTATOR RULES	
D6.1		<p>General</p> <p>The organizers typically do not have a direct line of communication with spectators other than on-the-spot at the competition; thus, the competitors, faculty and volunteers are expected to help inform the spectators of the safety rules and help restrict spectators to the spectator areas.</p>
D6.2		<p>Alcoholic Beverages</p> <p>Spectators may not drink or possess alcoholic beverages at any competition location.</p>
D6.3		<p>Access Restrictions</p> <p>Spectators must keep a specified distance back decided by G KARTING and the organizers, from any area where vehicles are operating under power. Motor vehicle competitions are potentially dangerous and safety rules will be strictly enforced.</p>
D6.4		<p>Children</p> <p>A competition site is not a safe place for children and unsupervised young people. Spectators who fail to strictly control their children will be asked to leave the site.</p>
D6.5		<p>Removal of Spectators</p> <p>The course officials and organizers have the absolute right to restrict spectator access to any parts of the site and to eject anyone who violates safety rules or ignores the instructions of officials.</p>
D6.6		<p>Unsafe Practices and Conduct</p> <p>All participants are required to exercise safe practices and avoid unsafe activities at all times during the competition. The event organizer has the discretionary authority to impose a just penalty for any conduct deemed unsafe. All</p>

		team members will be held to this rule.
D7	ARTICLE - MISCELLANEOUS	
D7.1		Driver Equipment Drivers must wear all of the equipment specified in “Driver Equipment Requirements” and a properly fastened restraint system at all times when the vehicle is running in any event or on the practice track.
D7.2		Drivers not wearing the proper equipment will not be permitted to drive, and may have their competition driver’s privileges revoked.
D8	SAFETY – TEAM RESPONSIBILITY	
D8.1		Safety is the primary consideration in the design of G KARTING vehicles and the conduct of the competitions.
D8.2		Teams need to include safety considerations in all parts of their program.
D8.3		At all performance events, it is the responsibility of the team to ensure both the vehicle and Driver meets and follow all the requirements and restrictions of the rules.