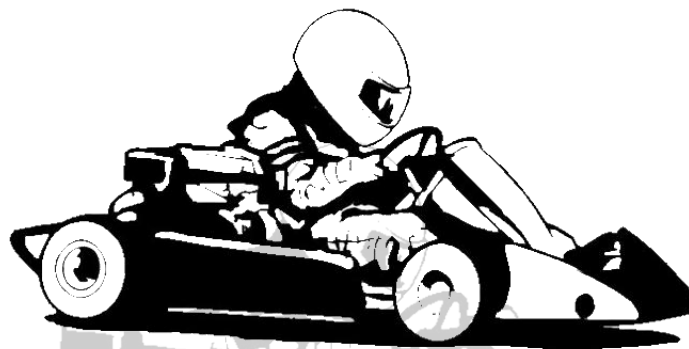




FORMULA 9 CHAMPIONSHIP – SEASON 2
WWW.FORMULA9.IN



FORMULA 9 Rules Booklet

Version 2.0



PART I: ORGANISATION AND CHAMPIONSHIP

Formula 9 is an effort to promote and initiate competitive sport at the most elemental level. The main aim of this event is to create a real world practical applications with the engineering concepts.

Objective:

To design a single seater combustion engine and electric vehicle that to be tested in a series of events. The vehicle will be put to test in terms of build quality, speed, acceleration, maneuverability and endurance.

PART 2: ORGANISING COMMITTEE

Our Mission

To encourage healthy engineering practises among students and create a platform that produces good engineers to Industry.

Our Vision

To connect professionals and students to enable safe, clean, and accessible engineering solutions.

About Us

The organisation provides a platform for young enthusiasts, engineers and car lovers to show-case their talent and their technical skills at a grandeur stage. Racing is not just about speed but more about how you survive breakdowns and the best way to do so is by competing with the best. The Sponsor enrich with kart racing events where you can learn while having fun. The organisation “Sumathi Motorsports” promotes innovation for future application and provides student with an opportunity to be recognized at national level for their Research and Development in interdisciplinary fields. Take up this opportunity to get a chance to go head to head with the best minds in this country.

PART 3: OFFICIAL ANNOUNCEMENTS

The entire official announcement regarding “Formula 9” will be published on

<http://www.formula9.in>

<http://www.facebook.com/Formula9.cbe>

<http://www.instagram.com/Formula.9>

Email ID: formula9.official@gmail.com

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FORMULA 9

A. ADMINISTRATIVE REGULATIONS

A1 COMPETITION OVERVIEW:

A1.1 Competition Procedure

- The competition criteria is split into
 - Internal Combustion Engine Vehicle (CV)
 - Electric Vehicle (EV)
- The competition starts with a series of technical inspections described in chapter IN to check the vehicle for safety and compliance with the rules as in chapter T.
- The competition is divided into a series of static and dynamic events described in chapters S and D. **The CV and EV will compete together on final event.**

A2 VEHICLE ELIGIBILITY

A2.1 Student Competition

Vehicles entered into the competition must be conceived, designed and maintained by the student team members without direct involvement from professional engineers, racers, machinists or related professionals.

A3 RULES OF CONDUCT

A3.1 General Officials Authority

- The officials reserve the right to revise the schedule of the competition and/or interpret or modify the competition rules or to terminate at any time and in any manner that is, in their sole judgment, required for safe and efficient operation.
- Official announcements shall be considered part of these rules.
- Failure of a team member to follow an instruction or command directed specifically to that team or team member possessed by the officials will result in a 20 points penalty to disqualification of the team.

A3.2 Unsportsmanlike Conduct

In the event of unsportsmanlike conduct, the team will receive a 20 points penalty. A second violation will result in expulsion of the team from the competition.

A4 GENERAL REQUIREMENTS FOR TEAMS & PARTICIPANTS

A4.1 Teams per University

A university may register up to three teams from each domain/department.

A4.2 Team Members

- A team member may only be part of one team, work on one vehicle and take part in static and dynamic events for only one team.
- Each team must have one team member identified as the team captain. The team captain is the main contact person for the officials during the registration process and whole through the competition.
- The team captain must have a 'current' student status at the attended College or University, at the time of the competition.

A4.3 Student Status

Team members must be enrolled as degree seeking undergraduate or graduate students in any university. Team members who have graduated within the seven month period prior to the competition remain eligible to participate.

A4.4 Age

Team members must be at least sixteen (16yrs) years of age.

A4.5 Driver's License

Designated drivers for the team are required to bring a hardcopy of both sides and original of their valid license (Four Wheeler) provided by the State government to the competition site provided.

A4.6 Insurance

A team can have up to two drivers and must provide their valid and current date medical insurance at the venue, failing to; the driver will not be allowed to drive the vehicle at the event.

A5 DOCUMENTATION & DEADLINES

A5.1 Submission of Documents

- By submitting documents via the competition website or by the mail, the team agrees that they may be reproduced and distributed by the officials, in both complete and edited versions, for educational purpose.
- Submissions later than the initial deadline will be penalized from the team points (Static Points).

- If the teams failed to provide their original documents regarding their teams and team members will be de-registered from the event.

A6 TEAM MEMBER INFORMATION (TMI)

- All team members must provide details towards the Team Member Information (TMI) submission available on the competition website during their team registration.
- Participants with incorrect information shall have their participation status revoked on-site at the competition before the static events by paying some penalties.
- A confirmed registration of maximum 20/30 team members and minimum 5 team members is applicable.

A7 GENERAL RULES

A7.1 Removing the Vehicle from the Site

- Teams who remove their vehicle from the competition site after the competition has begun will be disqualified from the competition. Teams may remove their vehicle from the competition site during the competition if no technical inspection stickers have been received.
- The competition officials disassociate themselves from all activities of the teams besides their own competition and associated events.
- Organizers reserve the right to disqualify a team registered for their competition in case of unsafe driving behaviour, especially if the reputation of the competition, sponsors and other teams is compromised. This includes any questionable material posted on social media by registered participating teams under the competition.

A7.2 Onsite Working Safety

Everyone in the dynamic area and everybody working on the vehicle must wear and use appropriate protection gadgets and tools.

A7.3 Alcohol and Illegal Material

Alcohol, illegal drugs, weapons or other illegal material are prohibited on the competition site during the competition and if found the respective team will be disqualified on spot.

A7.4 Vehicle Movement

Vehicles must not move under their own power anywhere other than on the practice or competition tracks, it must use pushbar/kart stand for movements.

SAFETY REQUIREMENTS

SR1 Driver Equipment

The equipment specified below must be worn by the driver anytime while in the cockpit with the engine running and anytime between starting a dynamic event and either finishing or abandoning a dynamic event. Removal of any driver equipment during the event will result in disqualification.

SR1.1 Driver's Suit- A fire resistant one piece suit, made from a minimum of 1 layer that covers the body from the neck down to the ankles and the wrists. The suit must be certified to either one of the following standards and be labelled as such: SFI 3.2 or 3.3 (or higher) FIA Standard 1986

SR1.2 Underclothing- Every driver must wear underclothing of fire resistant material like cotton. The shirt must be full sleeve and should cover maximum body part.

SR1.3 Helmet- A well-fitting, closed face helmet that meets Snell, ISI/BIS, SFI, FIA rated full faced/masked helmet.

SR1.4 Balaclava- A balaclava which covers the driver's head, hair and neck, made from an acceptable fire resistant material as or a full helmet skirt of acceptable fire resistant material. The balaclava requirement applies to drivers of either gender, with any hair length.

SR1.5 Gloves - Fire resistant gloves made from acceptable fire resistant material. Gloves of all leather construction or fire resistant gloves constructed using leather palms with no insulating fire resisting material underneath are not acceptable.

SR1.6 Socks- Fire resistant socks made from acceptable fire resistant material, which cover the bare skin between the driver's suit and the boots or shoes.

SR1.7 Shoes- Fire resistant shoes made from acceptable fire resistant material. The shoes must be certified to SFI or FIA standard.

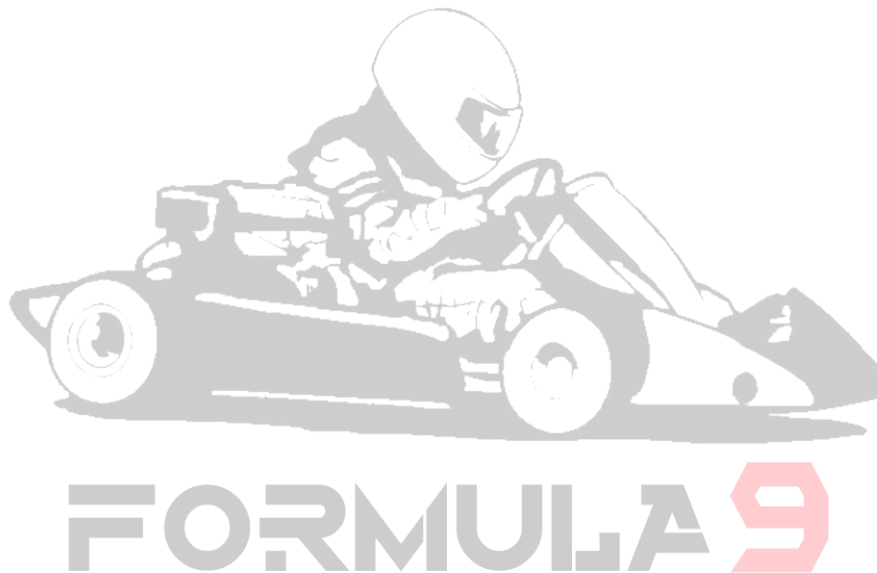
SR1.8 Neck Support- All drivers must wear a neck support/collar. The neck support must be a full circle (360°) and SFI rated

SR2 Fire Extinguishers

- Each team must have at least two dry chemical/dry powder ABC type fire extinguishers with a minimum fire fighting agent capacity of 1 KG.
- Except for the initial inspection, one extinguisher must readily be available in the team's paddock area, and the second must accompany the vehicle wherever the vehicle is moved. Both extinguishers must be presented with the vehicle at technical inspection.

SR3 Push bar / Jack lift

- Each team should have push bar painted in red colour to push or pull the vehicle while standing erect behind the vehicle.
- The teams can also have mechanical jacks to lift their vehicle from ground while moving from one place to another.



T GENERAL TECHNICAL REQUIREMENTS

T1 GENERAL DESIGN REQUIREMENTS

T1.1 Vehicle Configuration

- The vehicle must be designed and fabricated in accordance with good engineering practices.
- The vehicle must be open-wheeled, single seat and open cockpit with four wheels, where front and rear wheels must not lie in a straight line.
- The vehicle must have a **wheelbase within 1000 mm to 1400 mm.**
- The smaller track of the vehicle **must be not less than 75 % of the wheelbase.**
- The **overall length** must be less than **1900 mm** and width must be less than **1500 mm**
- **The lowest point of the vehicle** must be minimum **1.5 inch(s) above the ground.**
- The maximum turning radius of the Kart must be less than or equal to 3.0 m.
- All static parts should be rigidly fixed.

T1.2 Wheels and Tires

- Vehicles must use standard Go Kart tyres only.
- Standard wheel bolts and studs (lock nuts only) must be made of steel and are considered engineering fasteners. Teams using modified lug bolts, studs or custom designs will be required to provide proof that good engineering practices have been followed in their design.
- The teams which don't have this proper locking system will lead to disqualification.
- A minimum **air gap of 1.5 inches during static and in dynamic condition** from all corners of the wheel must be maintained.

T1.3 Steering

- Steering systems using cables or belts for actuation are prohibited.
- The steering wheel must be mechanically connected to the front wheels.
- The steering system must have positive steering stops that prevent the steering linkages from locking up.
- Allowable steering system free play is limited to a total of 7° measured at the steering wheel.

T2 GENERAL CHASIS DESIGN

T2.1 Minimum Material Requirements

- The minimum requirements for the members of the primary structure(Chassis) is **1 inch diameter and 1.5mm thickness (seamless steel tubing-must have minimum carbon content percentage above 0.18%)**, any material other than seamless steel tubing must meet the material requirements of 1 inch diameter and 1.5mm thickness.
- Except for inspection holes, any holes drilled in any tube which is a member of the primary structure is prohibited.
- Any tubing with a wall thickness less than 1.5 mm is considered non-structural and will be ignored when assessing compliance to any rule regarding the vehicle structure.

T2.2 Structural Documentation

- All teams must submit a Structural Calculation and should contain a three dimensional CAD model of the chassis including all members of the primary structure and all mechanical attachment details of the firewall and bumper's, which should be submitted in both Virtual and static rounds.
- Deviation up to 10% from Structural Documentation and Structural Calculation is permissible.

T3 COCKPIT

T3.1 Cockpit Opening

- The size of the cockpit opening needs to be sufficient for the driver and the steering system must pass vertically in the centre of the vehicle.
- No sharp objects should be there in the cockpit.

T3.2 Driver's Harness Attachment

The attachment of the drivers harness must be welded to a steel structure of the chassis or firewall.

T3.3 Driver's Seat

- Adequate insulation must be provided to ensure that the driver is not able to contact any parts of the vehicle. A minimum air gap of 1.5 inches from all corners of the driver seat must be maintained.
- The driver seat must be a bucket seat type and should be rigidly fixed to the vehicle primary structure or to the floor closeout.



Bucket Seat

T3.4 Floor Closeout

- All vehicles must have a floor closeout made of one or more panels, which separate the driver from the ground starting from front to the firewall.
- The panels must be made of a sheet, non-brittle material.

T3.5 Firewall and Impact Structures

- A firewall must separate the driver compartment from all components of the fuel supply system and any Tractive System (TS) component.
- The firewall must be a non-permeable surface made from a rigid, fire resistant material, which must be rigidly mounted to the vehicle's structure.
- Side(s), Front and Rear bumpers (Impact structures) are mandatory and must be welded to the primary structure of the chassis and no components of the vehicle must lie beyond the impact structures.

T3.6 Driver Visibility and Egress

- The driver must have adequate visibility to the front and sides of the vehicle, seated in a normal driving position. The required visibility may be obtained by the driver turning their head and/or the use of mirrors.
- All drivers must be able to exit to the side of the vehicle in less than 5 seconds with the driver in the fully seated position, hands in the driving position on the connected steering wheel and wearing the required driver equipment.
- The driver must be able to control and access all the control elements that must be placed in ease access of the driver from the cockpit.

T4 Driver Safety Belts

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

T5 BRAKE SYSTEM

T5.1 Brake System - General

- The vehicle must be equipped with a mechanical braking system that acts on at-least two wheels and is operated by a single control.
- The brake pedal must be fabricated from steel or aluminium or machined from steel, aluminium.

T5.2 Brake Light

The vehicle must be equipped with brake light (Red colour – LED) with minimum shining surface of 15 cm² that clearly visible from the rear in very bright sunlight.

T5.3 Brake Over travel switch

- All the vehicles must have a properly mounted brake over travel switch. This switch should not be operable in normal braking conditions, it must act in case of brake failure or the over travel of the brake pedal in case of brake failure.
- This switch must kill the engine but not the brake light connection when pressed. Push to off kill switch must be used.

T6 POWERTRAIN

T6.1 Transmission and Drive

Any transmission and drivetrain may be used.

T6.2 System Sealing

Any cooling or lubrication system must be sealed to prevent leakage.

T6.3 Drive Train Shields and Guards

- Exposed rotating final drivetrain parts, chains and belts must be fitted with shields or guards.
- All fasteners attaching shields and guards must be 6 mm metric grade 8.8 or stronger.

T7 FASTENERS

- **All threaded fasteners used in the vehicle must meet or exceed metric grade 8.8 or equivalent.**
- All fasteners must be secured from unintentional loosening by the use of **locking nuts**.
- A minimum of **two full threads** must project from any lock nut.
- Adjustable tie-rod ends must be constrained with a jam nut to prevent loosening.

T8 CONTROL SWITCH

T8.1 Master Switch

- Master Switch, a mechanical switch of the rotary type must be used, and must only be removable in electrically open position. They must be direct acting, i.e. they must not act through a relay or logic.
- Master Switch must be used that are located such that it is easily actuated from outside the vehicle and to the ease access of the driver from his/her driving position.

T8.2 Kill Switch

- The vehicle must be equipped with at least two kill switches. These kill switches must be able to cut off all the electrical connections including ignition system and must be rigidly mounted near the steering handle where the driver can easily control it.
- Second kill switch should be placed in left side of the vehicle such that in emergency the external person can operate it easily.
- This switch must kill the engine but not the brake light connection when pressed. Push to off kill switch must be used.

T9 WIRING/PIPELINES

- All wire connections must have a proper Pipelines
- No pipelines/wire connections must go under the chassis. It is strictly prohibited. Doing so may lead to disqualification of the team.
- Teams are recommended to join the wires by lugs to avoid poor earthing and loose connections due to vibration.
- All Electrical connections/terminals must be properly routed and insulated, must not interfere driver in static and dynamic condition

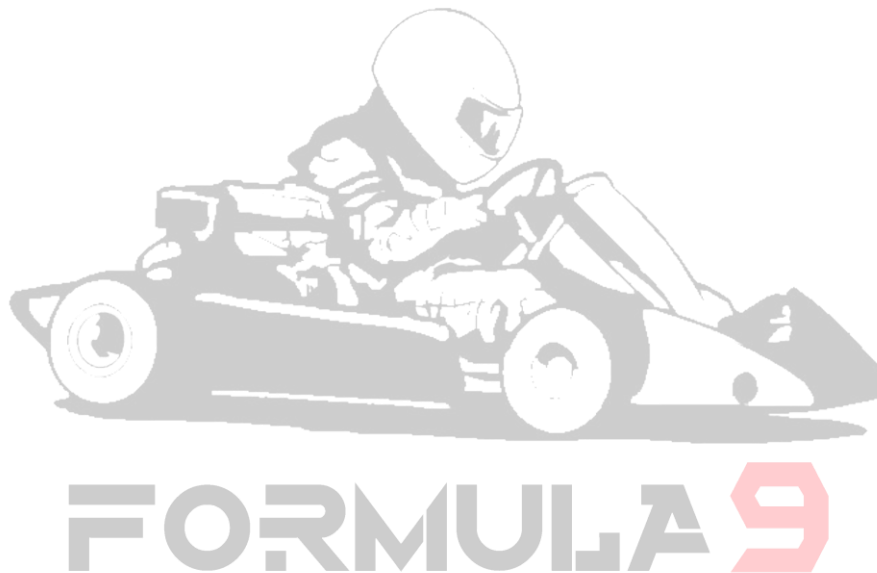
T10 BODY WORKS

- Every vehicle must have a proper body works/panels.
- All body works/panels must be mounted to the frame by fasteners only.

T10.2 Vehicle Number

- Each vehicle will be assigned a number that can be choose by the team itself with three preferences. With the provided preference the organisers will select any one of your preference as the vehicle identification number.

- Vehicle numbers must appear on the vehicle at the front and both sides as follows:
 - Height: At least 150 mm high;
 - Stroke width and spacing between numbers: At least 20 mm.
 - Colour: Either white numbers on a black background or black numbers on a white background.



CV INTERNAL COMBUSTION ENGINE VEHICLES

CV1 INTERNAL COMBUSTION ENGINE POWERTRAINS

CV1.1 Engine Requirements

- The engine(s) used to power the vehicle must be piston engine(s) using a four-stroke primary heat cycle with a displacement not exceeding **130 cm³ / 160 cm³** per cycle. Hybrid powertrains, such as those using electric motors running off stored energy, are prohibited.
- Teams are free to modify/tune the engine but it does not affect the engine actual cubic Capacity CC. The CC of the engine will be also checked before the dynamic round using sophisticated equipment's.
- Original bills or the original vehicle registration papers (if vehicle belongs to a team member) or an attested No Objection Certificate (NOC) from the owner with the original
- Registration Papers is to be submitted during Technical Inspection.
- Air filters must be used.
- Industrial engines are also allowed.
- Only Electrical start is allowed.

CV1.2 Throttle

- The throttle must be actuated mechanically by a foot pedal, i.e. via a cable or a rod system.
- The throttle system mechanism must be protected from debris ingress to prevent jamming.

CV1.3 Throttle Actuation

- Throttle cables or rods must have smooth operation and must not have the possibility of binding or sticking. They must be protected from being bent or kinked by the driver's foot during operation or when entering the vehicle.
- A positive pedal stop must be incorporated on the accelerator pedal to prevent over-stressing the throttle cable or actuation system.
- An Electronic Throttle Control system that is commercially available may be used, only if it does comply with the intent of the rules and is approved by the officials. To obtain approval, the team must:
 - Submit an additional page in the system description with intent of using such a system.
 - Include sufficient technical details of these deviations to allow the acceptability of the commercial system to be determined.

CV2 FUEL AND FUEL SYSTEM

CV2.1 Fuel

- The available fuel type will be unleaded gasoline 95RON (petrol).
- The vehicle fuel must be bared by teams itself.

- The temperature of fuel introduced into the fuel system may not be changed with the intent to improve calculated efficiency.

CV2.2 Fuel Tank and Location Requirements

- All parts of the fuel storage and supply system must lie within the outside edge of the four tires. In side view no portion of the fuel system can project below the lower surface of the chassis.
- All fuel tanks must be shielded from side or rear impact collisions. All parts of the fuel storage and supply system must be adequately protected against any heat sources and located at least 50 mm from any exhaust system component.
- Fuel tanks made of a rigid material must be securely attached to the vehicle structure with mountings.
- The fuel tank must be tightly closed from leak-aging of fuel.

CV2.3 Fuel Lines

- Fuel lines must be securely attached to the vehicle and/or engine.
- All fuel lines must be shielded from possible rotating equipment failure or collision damage.
- The hose pipe carrying fuel must be made of hard compound and should withstand high temperature.
- Teams must use clamps at the joints of fuel hose pipe.

CV3 EXHAUST SYSTEM

- The exhaust must be routed so that the driver is not subjected to fumes at any speed considering the draft of the vehicle.
- The exhaust outlet(s) must not extend more behind the centreline of the rear axle.
- Any exhaust components that protrude from the side of the body must be shielded to prevent contact by persons approaching the vehicle or a driver exiting the vehicle.
- Only metal porous sheet or other equivalent grade must be used to cover the exhaust pipes.

CV4 ELECTRIC SYSTEM

CV4.1 Master Switch

- The vehicle must have one master switch.
- The master switch must disable power from the battery and the alternator to all electrical circuits, including lights, fuel pump(s), ignition, electrical controls.
- It must also be able to shut down the system.

CV4.2 Voltage Limit

The maximum permitted voltage between any two electrical connections is 12 V DC.

EV ELECTRIC VEHICLES

EV1 ELECTRIC POWERTRAIN

EV1.1 Motors

- **Only DC motors** are allowed (BLDC, PMDC, and HUB MOTOR WHEEL).
- The motor(s) must be connected to the accumulator through a motor controller.
- The speed controller for the motor should be in accordance with the motor specification.

EV1.2 Power Limitation

- The maximum motor and controller specification must not exceed **3 kW**.
- Maximum system current must not exceed 80A.
- Maximum power drawn from the accumulator is 60V DC and 100Ah.

EV2 GENERAL REQUIREMENTS

EV2.1 Overcurrent Protection

- All electrical systems must have appropriate overcurrent protection. The continuous current rating of the overcurrent protection must not be greater than the continuous current rating of any electrical component, for example wire, bus-bar, cell or other conductor that it protects. I.e. if multiple pins of a connector are used to carry currents in parallel, each pin must be appropriately protected.
- All overcurrent protection devices must be rated for the highest voltage in the systems they protect. All devices used must be rated for DC.
- **The Traction System high current path through the accumulator(s) must be fused.**
- Minimum of 1 fuse (of rating \leq System Current) is mandatory at primary output of battery

EV3 CHARGERS

- All chargers must either be accredited to a recognized standard and all terminals and connections must be insulated without any compliance to the safety.
- There will be a separated charging area on the competition site. Charging TS accumulators is only allowed inside this area.

IN. TECHNICAL INSPECTION

IN 1 GENERAL

IN 1.1 Technical Inspection Objective

The technical inspections are to determine if the vehicle is able to participate in the dynamic events and is compliant to the rules.

IN 1.2 Technical Inspection Process

- The vehicle can bare up to 3 attempts in the Technical Inspection and failing towards the attempts, the team will be disqualified on TI and will not be able to participate in Dynamic events.
- The technical inspection is divided into the following parts:
 - Safety Inspection
 - Mechanical Inspection
 - Electrical Inspection
 - Vehicle Weighing
 - Brake Test

IN 1.3 General Rules

- The technical inspection sheet includes all inspection points and will be provided on the competition. It must always stay with the vehicle.
- The officials may inspect other points not mentioned on the technical inspection sheet to ensure compliance with the rules.
- Teams are responsible for confirming that their vehicle and the required equipment satisfies the requirements and restrictions of the rules before presenting it for technical inspection and should be in ready-to-race condition.
- The vehicle must maintain all required specifications throughout the competition.
- Once the vehicle is approved for competition, any damage to the vehicle that requires repair(s) will void the inspection approval. After completion of the repair(s), the vehicle must be re-submitted to technical inspection for re-approval.

IN 1.4 Modifications and Repairs

After technical inspection, the only modifications permitted to the vehicle are:

- Adjustment of belts, chains and clutches
- Adjustment of the brake bias
- Adjustment of the driver restraint system, seat and pedal assembly
- Substitution of the head restraint or seat insert for different drivers
- Adjustment of tire pressure

- Replacement of defective tires or brake pads. Replacement tires and brake pads must be identical in material/composition/size to those presented and approved at technical inspection.

IN 2 ELECTRICAL INSPECTION

IN 2.1 Electrical Inspection Objective

- During the electrical inspection, all electrical parts and systems of the vehicle are checked for compliance with the rules.
- The technical specification of the electrical components, wiring system, wiring connections, master switches and other electrical components will be checked with compliance to the rules.

IN 3 MECHANICAL INSPECTION

IN 3.1 Mechanical Inspection Objective

During the mechanical inspection, all mechanical parts of the vehicle are checked for compliance with the rules.

IN 4 VEHICLE WEIGHING

- At the vehicle weighing, the vehicle's official technical inspection weight is determined.
- All vehicles must be weighed in ready-to-race condition.
- All fluids must be at their maximum fill level for weighing.

IN 5 POST EVENT INSPECTION

IN 5.1 Post Event Inspection Objective

The officials reserve the right to impound any vehicle at any time during or after any of the dynamic events to check for compliance with the rules. If necessary the vehicle will remain with the officials until the violation of the rule was discussed with the team.

IN 5.2 Post Event Inspection Procedure

- After any dynamic event, the vehicle must be in compliance with the rules.
- For each violation of the rules, the team receives a separate penalty as follows:
 - Group A: Violation of the rules without advantage for the team
 - Group B: Violation of the rules with advantage for the team

The penalties for Group A and Group B will be decided on spot based upon the changes and test.

S STATIC EVENTS

S 1 BUSINESS PLAN PRESENTATION EVENT (BPP)

S 1.1 Business Plan Presentation Procedure

- **Presentations are limited to a maximum of ten minutes.** The judges will stop any presentation exceeding ten minutes.
- The presentation will not be interrupted by questions. Immediately following the presentation there will be a question and answer session.
- Data projectors or screens with VGA and HDMI (type A) input connectors will be provided for video signal transmission. Teams planning to use audio or other presentation equipment are responsible for bringing it themselves.
- Teams that fail to make their presentation within their assigned time period will receive zero points for the BPP.
- The executive summary of the BPP must be submitted during BPP and must not exceed 10 pages. Team name and university (or college) name must be written in the front page and the documents must be binded (calico).

S 1.2 Business Plan Presentation Scoring

- The judging at the competition is solely based upon Judging Criteria and Judges.
- The scoring of the BPP is based on the average of the scores given by each of the judges.

S 2 COST AND MANUFACTURING EVENT

- Prior to the competition, three set of documents or Summary must be submitted to the competition judging panel members.
- The teams must present their vehicle at the designated time to the judges. Teams that miss their time slot will lose all cost points for that day/Event.
- Teams are allowed to bring electronic, handwritten, or printed hand-outs, flip charts or similar to the event, but the space available may be limited.

S 2.2 Cost Report Documents (CRD)

The CRD consists of the following documents:

- Bill's for the manufactured raw materials
- Bill's for the non-manufactured materials used in the vehicle

S 3 ENGINEERING DESIGN EVENT

S 3.1 Engineering Design Objective

The concept of the design event is to evaluate the student's engineering process and effort that went into the design of a vehicle, meeting the intent of the competition.

S 3.2 Engineering Design Report (EDR)

- The EDR should contain a brief description of the overall vehicle with a review and derivation of the team's design objectives. Any information to scope, explain or highlight design features, concepts, methods or objectives to express the value and performance of the vehicle to the judges shall be included at the teams' discretion.
- The EDR must not exceed 30 pages. Any measures to facilitate reviewing the drawings (e.g. measurements, details, colours) may be utilized at the teams' discretion.
- The EDR must contain 3D CAD model and 2D Drawings of all the parts manufacture by the team itself, and electrical wiring diagrams.
- It must contain chassis deformation, stress and strain analysis; and thermal analysis of Brake disk.
- It must contain **table of contents**, and two tables listing the prefabricated parts and manufactured parts.
- The document must contain the team name and university (or college) name if the front, and the documents must be binded (calico).

S 3.3 Innovation Report

- The report must contain detailed explanation of each innovation work
- It must contain a table with a list of innovation in the front
- The document must contain the team name and university (or college) name if the front, and the documents must be binded (calico).

S 3.4 Engineering Design Vehicle Condition

- Vehicles must be presented for design judging in finished condition, fully assembled, complete and ready-to-race.
- The judges will not evaluate any vehicle that is presented at the design event in what they consider to be an unfinished state and will award zero points for the entire design event.
- Vehicles may be presented for design judging without having passed technical inspection, even if final tuning and setup is in progress.
- Covers and/or parts may be removed during the design judging to facilitate access and presentation of components or concepts.

D DYNAMIC EVENTS

D 1 DYNAMIC EVENTS GENERAL

Only Technical inspection, Brake test cleared vehicle will be allowed to enter Dynamic events.

D 1.1 Driver Limitations

- In total, two drivers are allowed for each team.
- The endurance and efficiency event is considered a single event.

D 1.2 Dynamic Area and Dynamic Vests

- The technical inspections and all dynamic events are held in the dynamic area.
- Only four members per team, including the driver, may enter the dynamic area.
- The number of tools that may be used in this area is restricted to those which can be safely carried by the four team members in one trip.

D 2 DRIVING RULES

D 2.1 Flags

- Flag signals are commands that must be obeyed immediately and without question.
- There will be a demonstration of flag rules session before dynamic events.

D 2.2 Driving Under Power

- During driving, the mechanical integrity of the vehicle must be maintained.
- The vehicle must be capable of starting and restarting without external assistance/batteries at all times.
- Push starts are prohibited.
- Vehicles may only be driven under power when running in a dynamic event and during brake test.

D 3 SKIDPAD EVENT

D 3.1 Skidpad Track Layout

- The Skidpad course consists of two pairs of concentric circles in a figure of eight pattern.
- Cones are placed around the inner circle and the outer circle.
- The line between the centres of the circles defines the start/finish line. A lap is defined as traveling around one of the circles, starting and ending at the start/finish line.
- Independent of the weather, the track conditions will be made to tough.

D 3.2 Skidpad Procedure

- Each team has two attempts and best timing of the two will be taken for evaluation.
- Each driver has the option to make a second run immediately after their first run.
- The starting order is based on the time the team arrives at the skidpad event.
- The vehicle will enter perpendicular to the figure of eight. The time period calculation will be the time gap between the entering of Front tyres into the Start line and the Rear tyre's into the finish line.

D 4 ACCELERATION EVENT

D 4.1 Acceleration Track Layout

The acceleration course is a straight line from starting line to finish line. The course is at least 5 m wide. Cones are placed along the course at intervals of about 5 m. Cone locations are not marked on the pavement. **Acceleration test is conducted along with Brake test.**

D 5 AUTOCROSS EVENT

D 5.1 Autocross Track Layout

- The autocross track layout is a handling course built to the Straights, Constant Turns, Hairpin Turns, Slaloms etc.
- The length of the autocross track is less than 1 km.

D 5.2 Autocross Procedure

- Each team has up to two runs, and the best timing will be taken for evaluation.
- Each driver has the option to make a second run immediately after their first run.

D 6 ENDURANCE AND EFFICIENCY EVENT

There will be a Qualifying round before the Endurance event, Teams should pass this round to participate in the final Endurance event.

Breakdown of vehicle, slowest vehicle, and unstable vehicle will not be allowed in the Final Endurance event

Qualifying round will have separate points.

D 6.1 Endurance Track Layout

- The endurance track layout is a closed lap circuit built to the following guidelines:
 - Straights
 - Constant Turns

- Hairpin Turns
- Slaloms
- The length of one lap of the endurance track is approximately 1.5– 2.5 km and may subject to change. The total timing of the Final Endurance test will strive up to 45 – 60 minutes.

D 6.2 Endurance Procedure

- Before entering the event, each CV's fuel tank must be filled to the fuel level line at the fuelling station and no refuelling/charging of batteries during the run is entertained.
- There is only one run for the endurance event.
- A driver change may be made during the run.
- Staging - The vehicle is staged at a staging line prior to the starting line.
- The first driver will be signalled into the driver change area for the change of drivers if requested by the team.
- After the driver change, the second driver will drive for the next runs until the vehicle reaches its finish line.
- After leaving the track, the vehicle must be powered down.
- The starting order is defined by the officials so that vehicles of similar speed potential are on track together, to reduce the need for overtaking.
- Endurance award will be given only after the successful completion of endurance timing by the vehicle.

D 6.3 Passing

- During the endurance event, overtaking is only permissible in the designated passing zones and under the control of the track marshals.
- Passing zones have two parallel lanes, a slow lane only used by the vehicles that are being overtaken and a fast lane for the vehicles that are overtaking.
- Passing zones may be situated on either the left or right of the fast lane.

D 6.4 Endurance Specific Regulations

- Teams are prohibited from working on or fuelling their vehicles during the run.
- Wheel-to-wheel racing is prohibited.
- If a vehicle has a restart problem at the driver change or after a red flag, it is allowed two minutes to restart the engine or to enable the tractive system. The two minutes start from the time the driver first tries to restart the engine or to enable the tractive system. The time is counted towards the endurance time.
- If restarts of the vehicle in some cases is only made by the driver. If it was not accomplished, the vehicle is scored as DNF for the run.
- If a vehicle breaks down it will be removed from the course and will not be allowed to re-enter the course.

D 6.5 Endurance Scoring

- Each lap of the endurance event is individually timed. The corrected elapsed time is determined by adding the extra-long lap for the driver change (if changed) from the total time and adding any penalty times.
- Relative Scoring will be Followed through out.

D 6.6 Efficiency Scoring

- Energy efficiency is measured during the endurance event.
- Only vehicles which score points in the endurance event will receive points for efficiency.

D 7 DYNAMIC EVENTS PENALTIES

D 7.1 General Penalties

- Penalties will not be assessed for accident avoidance or other reasons deemed sufficient by the officials.
- A cone is Down or Out (DOO) if the cone has been knocked over or the entire base of the cone lies outside the box marked around the cone in its undisturbed position.
- The DOO penalty is added for each DOO including entry and exit gate cones before the start and after the finish line, which occur on that particular run.
- Off-course (OC)
 - An OC occurs when the vehicle has all four wheels outside the course boundary as indicated by edge marking.
 - Missing one or more gates of a given slalom at autocross or endurance is counted as one OC per occurrence.
 - When an OC occurs, the driver must re-enter the track at the next possible point.
 - When re-entering the driver needs to wait for a gap and follow the instructions of the track marshals.
- DNF equals zero points for that run.
- If a team Did Not Attempt (DNA) an event the score is zero points.
- Each run with an incorrect number of laps at skidpad, Autocross will be penalised or given DNF.
- When a vehicle receives OC at skidpad, autocross will be given DNF
- Failure to obey a flag: one minute time penalty.
- Reckless or aggressive driving or “Over Driving”: one minute penalty or termination from the event.
- Vehicle to vehicle contact: Two minutes up to disqualification depending on the nature of the incident.
- If a vehicle stalls and cannot restart without external assistance, the vehicle is DNF for that run.

D 7.2 Endurance Penalties

- Out of order running: Teams that are not ready-to-race when their turn arrives for endurance are penalized two minutes and may then run at the discretion of the officials.
- A team may receive a DNF if their vehicle is too slow or being driven without proper control.
- Any violation to the procedure of driver change will lead to a time penalty of up to two minutes.

V VIRTUAL ROUND

V1 VIRTUAL ROUND(S)

V1.1 Definition

Virtual round is a Prequalifying round for the further participation in the events.

V1.2 General Guidelines

- In this virtual round the teams have to submit the presentation document or report should include Design report, CAE report, Innovation report, understanding of rule book and cost analysis, DFMEA Report and Gantt Chart in a single document.
- The judging criteria will be based on their virtual documents.

V1.3 Presentation Report Guidelines

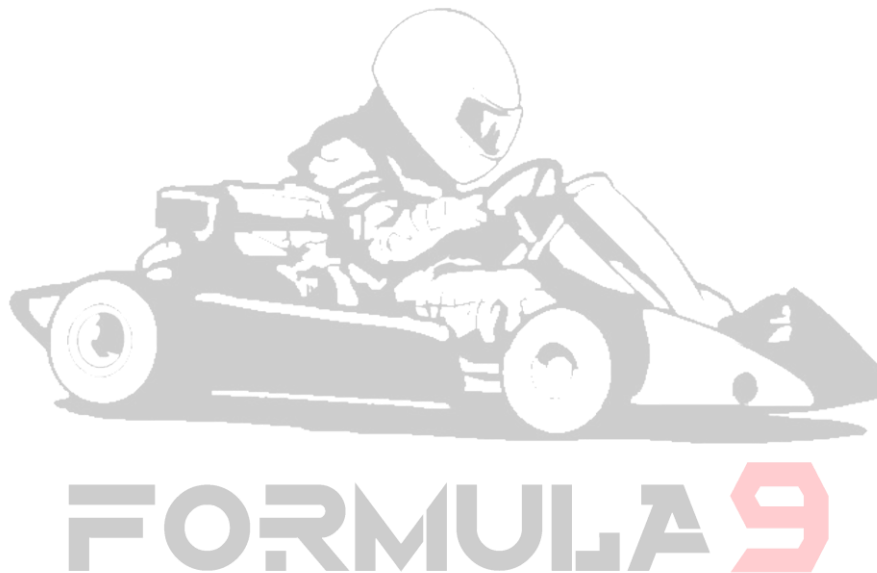
- The report must not exceed 30 pages which ensures V1.2 and must be included with team name, University/College and city.
- The Virtual round deadlines will be available in official sites. The teams with successful team formation of maximum 25/30 members and their payment registration will be prioritised in Virtual Round.
- The re-submission or changes to the submitted document is not allowed..
- The late submission of their documents or the successful payment and team registration is taken as no participation and the teams will be on waiting list/disqualified.
- The teams must use Times New Roman font with a maximum font size up to 14.
- The teams must also attach some relevant pictures working for the Virtual round (Logo of the Team and Formula 9 logo should be presented clearly on the picture) along with the submission of the Virtual presentation document.

V1.4 Results

The results/Rank list and date of results will be announced through the official sites and the dynamic registration for the event/competition will start.

Media and Pre Technical Inspection

- The teams must submit a 1-2 minute's video consists of fabrication ,cutting, bending, welding, test run etc on the deadlines mentioned. Failing to the submission the teams may lose their points on static events allotted for Media event. The video must include the team logo, institution logo, Formula 9 logo, Sumathi Motorsports logo and Sponsors logo if any.
- The Pre TI Sheet will be available on the Website as per F9 Season 2 Calender, the team must arrange for pre inspection of the vehicle along with brake test and vehicle safety by the faculty coordinators. The faculty coordinator may or may not be the teams faculty official faculty coordinator. The inspected TI Sheet must be Submitted before Deadline. The pre inspection photos, Brake test Video (Clear view of Locking of Wheels) etc must be posted on teams official id/team members id with hashtags Formula9.
- Failing to the above mentioned inspection, the teams are not allowed to enter TI on Event.





REGISTRATION DETAILS

Registration Agreement

By registering in Formula 9 the Team Captain/ Team Members/ Faculty Coordinator/ College Management must agree with the rules and registrations. They understand that all the information provided in the registration documents and online registration forms are correct to the best of their knowledge. Teams can register themselves on the Event Website.

Registration Fee

Team registration fees for the Formula 9 Championship – Season 2 is ₹ 25,000 (Inclusive of GST). The registration fee is non-refundable or non-adjustable in any circumstances.

First Installement – Virtual Fee - ₹ 5,000

Second Installement – Dynamic Fee (upto 20 members) - ₹ 20,000.

Total Fee - ₹ 25,000.

For extra member, INR.1500 (Inclusive of GST) per member. Minimum 5 and Maximum 30 Members are allowed in a Team.

The Team will be mailed with account details after their registration, the payment registration must be done before deadline, failing the teams registration will be cancelled.

In case of all girls team or a participating teams vehicle driver, the registration fee will be provided with a special discount/offer.

- Full Girls Team (₹ 15,000) – Virtual Fee - ₹ 5000 : Dynamic Fee(upto 20 members) - ₹ 10,000.
- Both driver-Female(₹ 20,000) – Virtual Fee - ₹ 5000 : Dynamic Fee(upto 20 members) - ₹ 15,000.

Mode of Payment

The teams may use any online payment mode for transaction of their registration fee.



FORMULA 9 – SEASON CALENDAR*

DESCRIPTION	START DATE	DEADLINE DATE
Virtual Event Registration	April 1,2019	July 31,2019
Virtual Event Payment	April 1,2019	July 31,2019
Virtual Documents	August 1,2019	August 10,2019
Virtual Event	August 11,2019	August 20,2019
Virtual Results	August 25,2019	
Dynamic Event Payment	August 25,2019	August 30,2019
Pre Inspection Sheet	September 01,2019	September 10,2019
Pre Inspection Pictures		September 15,2019
Video Submission		September 20,2019

FORMULA 9

*Tentative dates