veltech e-bike challenge
towards Eco-ovation....

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### SECTION 1

**Important Dates**

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<tr>
<th>S.No</th>
<th>Activity</th>
<th>Date</th>
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<tbody>
<tr>
<td>1</td>
<td>Registration Opens</td>
<td>September 28(^{th}) 2019</td>
</tr>
<tr>
<td>2</td>
<td>Workshop</td>
<td>February 2020</td>
</tr>
<tr>
<td>3</td>
<td>Last Date for Full Payment</td>
<td>January 10(^{th}) 2020</td>
</tr>
<tr>
<td>4</td>
<td>Design Validation Round (Virtual Round) (No Elimination in Virtual Round)</td>
<td>February 2020</td>
</tr>
<tr>
<td>5</td>
<td>Final Design Report Submission</td>
<td>February 2020</td>
</tr>
<tr>
<td>6</td>
<td>Technical Inspection</td>
<td>March 2020</td>
</tr>
<tr>
<td>7</td>
<td>Final Track Event</td>
<td>March 2020</td>
</tr>
</tbody>
</table>
SECTION 2
Organization and Governance

About Vel Tech:

Vel Tech is well-known for its renowned educational practices, which have been recognized and endowed with several awards. The founders of the Institution, Col. Prof. Vel.Dr. R. Rangarajan, Founder Chancellor & President and Dr. Sagunthala Rangarajan Foundress President believe in Education are for all despite their financial means which will promote and uplift the society. In accord with their vision, the Vel Tech Mahatma Gandhi Scholarship scheme was started and has supported students since the inception. Vel Tech has bestowed 9500 scholarships worth approximately Rs.99 Crore until 2019.

We are Passionate. Doers in Innovative Engineering Education

Global Alliances of Vel Tech has working International Relations with more than 390 Institutions across 30 countries and has entered in the Memorandum of Understanding (MoU) with 120 Institutions for various Academic and Research exchange activities. Students, Faculty members, and Researchers get the collaborative platform for Academic projects, explore leading best practices and research work with International Universities. Vel Tech believes that there are no boundaries in the pursuit of knowledge. Through these strategic alliances with International Universities, the standard of education at Vel Tech would be on par with the best in the world.

About Vel Tech e-Bike Challenge:

The Indian government has set ambitious targets to accelerate the adoption of Electric Vehicles and the Automotive Industries rapidly moving towards the development of Electric Vehicles. In this scenario, to provide a platform to our budding technocrats, to enhance their knowledge and technical skills into the reality of e-mobility. VTeC provides a platform for young engineers to exhibit their innovative ideas into reality and their skills are accessed by various static and dynamic events with the guidance of industrial exports. VTeC recognizes the team building activity and individual talent by providing a technical platform and also with huge awards and prizes.

Vel Tech e-Bike challenge is a competition to explore the theoretical and technical skills of engineering and diploma students. The main motto of this competition is to design, analysis, documentation and manufacturing of electric bike. The competition takes place in two stages; firstly, the design validation stage is known as Virtual Round. Secondly, Champion Round consists of Static, Dynamic and Endurance Test. The participating teams have the liberty to exhibits their innovation and new finding allied with the rule book. VTeC provides a platform to budding young engineers to exhibits their innovative
ideas into reality. VTeC forum encouraged the team members to undergo the literature survey before the design and manufacture of an electric bike.
SECTION 3
VTeC Rules and Regulations

3.1 Rules Authority
The team must follow each and every rule, regulations and restrictions given in the rule book. Vel Tech e-Bike challenge reserves right to modify each and every rule, regulation associated with the competition. Violation of rules by any individual or as a team or representative member may be liable to be penalized severely and eliminate or withdrawing or debarring of the team from the competition. Furthermore, a withdrawal of award/awards as well.

3.2 Validity of Rules
The rules, regulation, and restriction will be the same throughout the event and any amendments will immediately be made known to all the participating teams through emails and the same will be uploaded on the website.

3.3 Official Announcements
All the official announcements and the information regarding the competition will be displayed on the official website of the Vel Tech e-Bike challenge. Our official website is https://veltech.edu.in/fest/e-bike-challenge/. After completion of Registration, important information will be sent through the emails to the respective team mail id.

3.4 Rules Compliance
By registering event Vel Tech e-Bike challenge (VTeC), the team captain, members of the team as individuals, faculty advisors and other authority of the College/University agree to comply with and will be bounded by these rules, regulation, restriction, interpretations or procedures issued or announced by VTeC. All team members, faculty advisors, and other university authorities are required to cooperate with and follow all instructions, penalties, and results from competition organizers, officials, and judges.

3.5 Right To Impound
During the event, any team can be called for Technical Inspection and examination at any point of time and stage and can be questioned for any technical element related to the vehicle during the Event.

3.6 Participating In The Competition
The registered team, team captain, members, participant individuals, faculty advisor and college representatives of colleges and universities who are all present on competition venues are considered as Participating in the Competition. If earlier departure from the competition venue due to problem in the bike, medical reason, not cleared in the technical inspection or any other personal and official or non-personal reason considering as earlier withdrawing the team from the competition. At any circumstances, the registration fee is not adjustable or refundable.
3.7 Documents Submission
The team members are advised to submit the document in a given schedule time to avoid the delay in publishing the points and notifications. If any team wants to extend the time due to their university examination and other academic activity please send a request mail through the team advisor and forwarded by the head of the department/head of the institution/registrar stated the actual reason for requesting time extension and so on.

3.8 Misbehaviour
Misbehavior activity in any form of the registered team, individual or representative of the college/university will receive a penalty of points.

3.9 Arguments with Officials
Arguments with or disobedience to any official may result in the team being imposed with a high penalty of points.

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

3.11 Bike Shipping
The teams must ensure that their shipping agency or Freight Forwarder or Commercial carrier complies with all rules laid by the government for Inter-State Transportation. It is the responsibility of teams to ship the vehicle at the proper time so that it reaches the event-site before the start of the event. Teams must keep proper care during transport to avoid any damage to the Bike. Proper care must be taken while selecting the mode of shipping (Train/Truck etc.).

3.12 Penalties

Violation of Rules:
Penalty of 100 points imposed.

Misbehavior/Arguments with officials or volunteers:
A penalty of 100 points.

Tampering with TI sticker or making restricted changes in vehicle after TI:
A penalty of 100 points.

Others:
VTeC organizers have the rights to modify the penalties listed in the various events.
3.13 Remonstration

VTeC is recognized the students involvement and efforts to manufacturing the Bike by spending hard and valuable days and hours. The Vel Tech E-bike challenge organizer will make nevertheless effort to review all questions and disputes to resolve problems quickly and efficiently.
SECTION 4
Team Requirements

4.1 Team Requirements
The team registering in the Vel Tech e-Bike challenge must have a Team Name, Logo, Captain and the Faculty Advisor. There is no limitation on the number of registrations from the same college/university. Team size should not exceed 15 members per team.

4.2 Eligibility Criteria
Students from engineering PG, UG, degree/diploma streams are eligible to registering and participating in the event. Students must carry their college/ university ID card on the day of event.

4.3 Team Name and Logo
Each team must have unique team name. However, the teams are free to choose any team name as per their choice. The VTeC organizer found that any team name repeated, the second registering team are asked to select another name for their team. Every Team should have an Attractive and Meaningful Logo. Team Name should not hurt the sentiments of any person/religion and should not have any religious word. Team Name should not criticize any social action of any group of people or an Individual.

4.4 Bike number plate
A blank number plate should be provided at the front and the rear. A sticker representing the team number is provided during the event. The size of the number plate should be Basic Two-wheeler Number plate.

4.5 Integrated teams
As this is an engineering event. So, integrated teams are highly appreciable.

4.6 Faculty advisor
Every team requires a Faculty Advisor appointed by the College/University who will provide guidance as needed throughout the Electric Bike designing, manufacturing and testing Process. Faculty advisor should not be involved in manufacturing but can give only guidance. Faculty advisor is not allowed during dynamic event along with the team members. Faculty should not design any part of the vehicle nor help in the documentation/ presentation.
SECTION 5

Team Registration

5.1 Registration
Online registration will be available 24x7 on our website https://veltech.edu.in/fest/e-bike-challenge/ from September 28th, 2019 to November 30th, 2019. During the registration, students must pay the registration fee by using the payment link provided on the website.

5.2 Registration Agreement
By registering in the VTeC event, the Team Captain / Team Member / Faculty Advisor / College Management agrees with the rules and regulations of VTeC. They understand that all the information provided in the registration documents and online registration forms are correct to the best of their knowledge and also they accept that the team would undertake all the activities without the help of any professionals directly or indirectly. In case of any violation of the rules and regulations specified in the Rule Book, the teams are liable for disciplinary actions as per the decision of the VTeC organizing Management. The teams are also liable for any loss of documentation/communication on part of the discrepancy in the information as provided in the registration.

5.3 Registration Fee
Registration fee is paid through Online during the registration process. The registration amount is Rs.15000/- (Including GST). The registration fee will not be refunded for any reasons once the registration is completed.

5.4 Official Announcements
All the official announcements and the information regarding the VTeC event will be displayed on Vel Tech official website https://veltech.edu.in/fest/e-bike-challenge/. On successful registration of the team, all the important information will be provided to the team through E-mail as well as the official website. The team captain, members and faculty advisors are requested to frequently visit the website and E-mail for latest news updates. Further, feel free to contact us through E-mail for a better understanding of the new amendments or clarifications.
SECTION 6
Driver Requirements

6.1 Age
A team must have two drivers. The two drivers must be 18 or above the driver should be a member of the team.

6.2 Drivers License
Team Driver (s) must have a valid Driver’s License issued by the Government of India (Learner’s License not allowed). Driver(s) must carry the original license during the time of the event and produce the self-attested photocopy to the registration desk. The driver must produce the original license whenever the organizer asked. Before endurance test the Bike driver must show or produce the original license to organizing authority or technical team.

6.3 Medical Insurance with Full Accidental Cover
Drivers must have valid medical insurance with a full accidental cover which must be uploaded on the team account or event site. The photocopy of the insurance should be submitted to the VTeC inspection committee.

6.4 Drivers suit
The driver must wear an approved biker’s Jacket, Shoes, Gloves and Helmet and approved wearable during event. The jacket must be Fire Resistant.
SECTION 7
E-Bike Technical Requirements

Vehicle Manufacturing
The vehicle must be designed and fabricated by the students without taking direct help from Professional Engineers or any company. Teams have to submit a short video of 2 min of manufacturing the vehicle and also pictures taken during different manufacturing phases.

7.1 Design Requirements
The vehicle must have 2 wheels in a straight line. The point of contact between the tires and the road must be symmetrical about the longitudinal centerline of the vehicle. The handlebar must control the vehicle. It should control the front wheel and must be attached to the front wheel. The vehicle dimensions should be as follows:

<table>
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<th>S.NO</th>
<th>Parameters</th>
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<tr>
<td>1</td>
<td>Length</td>
<td>&lt;2000</td>
</tr>
<tr>
<td>2</td>
<td>Wheelbase</td>
<td>&lt;1300</td>
</tr>
<tr>
<td>3</td>
<td>Width</td>
<td>&lt;800</td>
</tr>
<tr>
<td>4</td>
<td>Handlebar height</td>
<td>&gt;800</td>
</tr>
</tbody>
</table>

Mudguards on front and rear wheels and leg guards are mandatory. Guard must withstand the bike weight.

7.2 Ground Clearance
Minimum ground clearance of 150mm must be maintained when measured from the lowest point of the vehicle. The ground clearance will be irrespective of the side stand provided.

7.3 Chassis Material
Teams can use a material of AISI or ASTM standard seamless pipes for manufacturing the chassis and for the other purposes. Compromise with the standard of the vehicle is not allowed. The team should manufacture their own chassis. The Mainframe pipes should be of a minimum 25mm diameter and a minimum thickness of 2mm. The chassis should contain a motor mounting location, steering head location, battery mounting space, rear suspension linkage. The footrest should not be lower than the bottom-most frame part. The chassis must have aside as well as a center stand.

7.4 Motor Specifications
Teams can use DC motor of any type. No, constrain on RPM and torque. The maximum motor power must be 1 kW. The maximum input voltage to the motor and controller should not exceed 48 volts. The original bill must mention motor wattage and voltage. Teams are allowed to use the Hub motor.
7.5 Transmission
Teams are free to use any kind of transmission and the maximum speed 45 kmph on full throttle on normal plain terrain. The transmission should be clearly visible during the technical inspection. The transmission can be a chain drive or belt drive or gears.

7.6 Electrical System
Electrical system must possess a Battery pack, Motor, Controller, indicators and all the other mandatory equipment using the battery power. Kill switch or tripper or fuse is mandatory. A red brake light must be used and must be operational whenever brake is actuated. All electrical units of the bike must draw power from the battery pack and battery pack only. Handle must have all electrical control systems for example: side indicators, motor start, etc.

7.7 Battery
Teams are allowed to use lithium ion battery which has a maximum voltage of 48 volts. Battery must be capable of powering the brake light and indicator light thought the event. Battery must be mounted properly on the chassis and it should be properly insulated. Battery terminals must be covered with an insulating material.

7.8 Handle Bar
The handlebar should not have any cracks or broken handles. Steering handle must be attached to the chassis properly and any failure in the attachments may lead to disqualification of the team.

7.9 Braking System
Breaking must be installed in both the wheels (front and rear). Teams are allowed to use any kind of braking system. Red light must be used to show the actuation of both brakes (front and rear).

7.10 Suspension System
The telescopic suspension is mandatory in the front. A swing arm with mono suspension or dual swing arm suspension can be used in the rear.

7.11 Tyres and Wheels
Teams are allowed to use alloy and spoke rims. 3*16 tires are recommended to be used in the vehicle.

7.12 Light Indicators
Indicator lights on front and rear for turning left and right are mandatory. Light must be of orange color.
7.13 Mirrors

Teams must use at least one mirror on the handlebar so that the rearview can be clearly visible to the driver.

7.14 Lock Nuts

Threaded fasteners used must meet or exceed the metric grade of 8.8. Use of lock nuts at every joint of the vehicle is mandatory. Fasteners used in the vehicle must have three threads visible past the nut.

7.15 Protection and Shielding

All the drive train rotating parts like belts, chains, shafts, etc must be covered and shielded and wheels must be properly covered with the mudguards. Teams are advised to use standard acceptable grades with metric grade M6 or M8 fasteners. There should no sharp edges or corners or any open holes left on the chassis.

7.16 Electrical Wiring

No wiring is allowed below chassis and electrical wiring should not go into the metallic pipes and wiring should be properly insulated with the plastic pipes.

7.17 Fire Extinguisher

Teams should have one fire extinguishers of 1kg and must be carried by the team. It should be of ABC type and easily accessible.

7.18 Body Works

Teams are allowed to use GI sheets, glass fibre, carbon fibre or any other material that has water resistant. Mud guard is mandatory.

7.19 Vehicle Stand

The vehicle must be equipped with the main stand and also side stand for the support and the vehicle must be able to stand without any support other than support provided by the two stands.

7.20 Vehicle Capacity

The vehicle must accommodate the driver of all sizes. The largest driver must meet the minimum clearance and fit into the comfortable driving position while wearing all the driving gear. The smallest driver must be able to access all the controls easily.

7.21 Innovation

Innovation can be attempted in the following areas of suspension, brake, electrical drive, frame, handle.
SECTION 8

Design Validation Round

Design Validation Round (Virtual) (DVR)
In the DVR presentation of all the research and development over the vehicle is to be given has to be submitted online. DVR details should be sent to the official mail id that has been provided. The prime objective is to design, analysis and documentation of the e-Bike vehicle. The design should be complete in all aspects to the extent of being considered ready for Manufacturing. The teams will be evaluated based on their knowledge of the basic automotive design, analysis, and documentation about the e-Bike design and manufacturing requirements. Further details/guidelines about the DVR will be sent to the official mail id of the team. The design validation round will be of two phases the teams that are not able to provide proper report can should resend the updated report for the second time and the evaluation will be done accordingly.

8.1 Documents Required For DVR
1. Vehicle Design
2. Design Report
3. Innovation Report
4. Cost Report
5. Design Validation Plan
6. Design Failure Mode Effect and Analysis (DFMEA)
7. Gantt Chart
8. Master layout

8.2 Design Report
The design report should contain design and details of all the components used in the bike and the reason for selection of that particular component/system. Design report will be verified with the vehicle at the time of static and dynamic event, so the design must be done carefully. Document must be submitted in pdf format. The design drafts should show the basic design views of the major components.

8.3 Innovation Report
The innovation will be evaluated TI-2. The evaluation will be done on the basis of team interviews, proper working of innovation throughout the event (in all the dynamic tests) and the concept of the innovation. Teams need to come up with entirely new and unique idea of innovation with working and not only an idea.
8.4 Cost Report

The vehicle must be manufactured in the budget INR 80,000/-. The market survey of all the components/systems used in the manufacturing of the vehicle in the form of a cost report must be submitted with the design report. The cost report should elaborate. Every component/assembly of the vehicle must be covered in the cost report. No need of accounting GST in the cost report. Cost excluding GST is expected in the report.

8.5 Design Validation Plan

The design validation plan is the assurance that a product, service or system meets the needs of the customer and other identified stakeholders. It often involves acceptance and suitability with external customers. All the virtual and real-time tests and analysis are to be included in the design validation plan.

8.6 Design Failure Mode Effect and Analysis (DFMEA)

A DFMEA is often the first step of a system reliability study. It involves reviewing as many components, assemblies, and subsystems as possible to identify failure modes and their causes and effects. For each component, the failure modes and their resulting effects on the rest of the system are recorded in a specific FMEA worksheet. There are three different types of DFMEA that exist such as Functional Design and Process. It is widely used in the development and manufacturing bike in various phases of the product life cycle analysis.

8.7 Gantt Charts

Gantt charts illustrate the start and finish dates of Art to Part elements of the e-Bike fabrication project. This chart is basically the management of the project and distribution of different tasks of the team members completed with the stipulated time. The Gantt chart must be attached along with the design report.
SECTION 9

Static Events

9.1 Design Report Vs Vehicle Analysis (Best Engineering Design and Best CAE)

The vehicle will be verified with the design report and deviations from the design report should not be allowed until and unless completely justify with documented reasons. Same way, VTeC understands the student’s difficulties during the manufacturing process of the E-Bike. For the benefit of the student’s deviation up to 20% from the design report is acceptable. Further, it will lead to penalized accordingly. The best CAE design will be awarded.

Note: Team should submit the Master layout of the electrical 2-wheeler showing all key dimensions drawing.

9.2 Manufacturing Level (Build Quality and Aesthetics)

The vehicle will be examined and evaluated by the judges at the time of static and dynamic tests, so the participating teams are advised to manufacture the vehicle with pre-planned strategies so that the vehicle would be able to compete in several tasks and tests.

9.3 Discussion (Questionnaire)

In the static test event, during evaluation and examining of the E-Bike, the technical team may interact with team members as individuals or whole. So, the VTeC advises the team members to prepare E-Bike related technical details for exhibiting their talent to impress the technical team members.

9.4 Innovation

The innovation planned in the E-Bike is to be presented in TI-2. The presented concepts will be discussed with the team and its working will be examined by the technical team in the respective pit of the teams. The team needs to present innovation report at the time of explaining the innovation. The innovation should be working and not just for the concept.

9.5 Technical Inspection

Before the dynamic event, there will be Technical Inspection (TI) which is mandatory for participating in a dynamic event. TI will be based on rulebook parameters and safety checks of the vehicle. The teams will be given chances for the TI test clearance with penalty. TI will be of three phases.

TI-1: In this, the vehicle will be inspected for Length, Height, Wheelbase, Width, Handlebar height, curb weight without the driver.

TI-2: In this, the vehicle will be inspected for electrical harness faults, motor and battery specifications, aesthetic, innovation, Safety equipment and vehicle stability.
TI-3: Team should give a presentation on 2D, 3D, and CAE reports and Business plans. Along with the presentation, all documents (cost, material testing, CAE, Driving license, Diver insurance, and innovation reports) hard copy has to be submitted.

9.6 Safety Equipment’s
Every team is advised to use proper safety equipment’s during manufacturing or during any repair work carried out on site. The technical team will inspect the safety equipment’s during Technical Inspection. FIRST AID kit is mandatory for every team.

9.7 Cost Report
Vehicle cost must be less than Rs 80,000/-. Attach all the forms for costing. Maintainability in line with the current practices of electrical two-wheelers. Serviceability to suit the standard tools available in present automobile garages.

9.8 Business Plan
Teams are expected to prepare a complete business plan by understanding the sector and industry. Every team has to do the complete market survey of the same segment and prepare the strategies to target the customers. The team has to prepare a presentation, which has to be presented during the TI-3. The team has to convince the judges with their business plan presentations. Every team has to submit the complete business plan report. Teams are advised not to include any confidentiality agreement in the business plan; our aim is to evaluate the concept of your business idea not to sell out your idea in the market. Teams are expected to work upon the following points and prepare both the report and the presentation accordingly;

Executive Summary:
This includes the organizational structure of your company. You need clearly define the roles for each member of the executive board. This member will then be responsible for the same in the report to follow.

Introduction to the Company:
Introduce your company and its vision and mission statement. Business/Company Profile: Explain your company profile in brief. The team is encouraged to prepare the brochure of the company, which will cover the entire details of the product. Industry and Market Analysis: Thorough and complete survey of industry performance. Market analysis for the demand of the product in the competition. Competitor analysis should be included with the detailed report on the same.

Marketing Strategies:
The basic plan of the company to tap the available market. Types of strategies the company proposes for marketing.
9.10 Rain Test

This test is mainly used to test the build quality of the vehicle in this test the vehicle will be kept under the shower for 1 minute and the water will be sprayed at a force, water shouldn’t penetrate into the electronic parts of the e-Bike.
SECTION 10
Dynamic Events

10.1 Brake Test (3 attempts)

It’s mandatory for a vehicle to pass the brake test to participate in any other dynamic events. The vehicle must stop in a straight line after the brake is applied on the vehicle and the wheels on which the brake mechanism is acting must get locked immediately after the pedal is pressed. Each vehicle will be given only 3 attempts to pass the brake test. After the successful brake test attempt, the vehicle will not be allowed to avail the remaining tests.

Vehicle dynamic stability will also be checked during this test, vehicle possessing abnormal behavior will be checked again. The TI can be canceled if the vehicle is found dynamically unstable or unsafe in the Brake Test. Few frequently occurred problems are listed below

- Brake squeal noise
- The unbalanced frame or frame twisting or frame vibration
- Improper wheel alignment etc.

If these issues found in the bike during the inspection, Technical Inspection will be canceled and chance will be provided to the team to rectify it.

10.2 Acceleration:

The main objective of the acceleration test is to check the performance of the vehicle during the acceleration. This test is mandatory for the teams. In this test, the vehicle is asked to accelerate from the starting line till the end and the point will be awarded according to the time taken for the vehicle to reach the end line from the starting line. The vehicle has to brake at the end line and the vehicle should not drift.

Note: Acceleration and brake test will be conducted simultaneously.

10.3 Autocross

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

The vehicle has to run on an “8” track for 4 laps continuously without stop. The vehicle should not come out of the track and the driver should not place his leg on the ground while performing the test.
10.4 Gradability

The vehicle has to run on inclines plane of an angle 30° with full throttle breaking should not be done while running on the inclined plane and the driver is not allowed to lay his legs on the plane.

No battery charging will be allowed during the dynamic test.

10.5 Range Test

In this efficiency test, the vehicle should run 20 min continuously on track, if the vehicle fails, due to battery drain out, it will be terminated for this round. The vehicle will be evaluated based on the battery voltage left after the run time. Bumps will be arranged on the track in certain places continuously.

Note: only the top 5 teams will be allowed for the endurance test.

10.6 Endurance Test

ENDURANCE test will be of 3 laps. Each lap of the endurance event will be individually timed by electronic or by stopwatch. The following are general guidelines for conducting the endurance event. The organizers reserve the right to establish procedures specific to the conduct of the event at the racing circuit.

Endurance Objective: The Endurance Event is designed to evaluate the overall performance of the vehicle and to test the vehicle’s reliability.

Charging will not be allowed during an endurance heat

Vehicle Breakdown and Stalls

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

10.7 Penalties

Disobeying Flags: 1 minute will be added as penalty.

Over Driving (After a closed black flag): 1 Minute will be added as penalty.

Vehicle to Vehicle contact: 1 Minute will be added as penalty.

Out of Order: Running out of order – two (2) minute penalty.
Rash or Aggressive Driving

Any rash or aggressive driving behavior (such as forcing another bike off the track, refusal to allow passing or close driving that would cause the likelihood of bike contact) will result in a black flag for that driver. When a driver receives a black flag signal, he must proceed to the penalty box to listen to a reprimand for his driving behavior. The amount of time spent in the penalty box will vary from one (1) to four (4) minutes depending upon the severity of the offense.

Inexperienced Driver

The VTeC organizing team may disqualify a driver if the driver is too slow, too aggressive or driving in a manner that in the sole opinion of the event.
SECTION 11
Judgment Categories

11.1 Judging Criterion

The participating teams are judged in two rounds i.e. Design Validation Round (Virtual), Static Test, Dynamic Test, and Endurance Test. Design Validation Round (Virtual) shortlists and awarded will be based on the presentation of the design report and various other parameters within the presentation. Virtual is the stage in which the documents like Vehicle Design, Design Report, Innovation, Cost Analysis, Design Validation, and Gantt chart. Reports to be evaluated by the judges followed by a presentation and discussion with the team representatives the team may be awarded. The decision of the judges will be final and binding. The teams and their fabricated E-Bike Vehicles will be judged in a series of static and dynamic events including Technical Inspection, Cost, Marketing presentation, Engineering Design, performance and Endurance test on the track. The judges will be observing all the team members and may ask questions randomly to any team members for evaluating various parameters these events are scored to determine how well the vehicle performs.

11.2 Points Allotment

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<th>SI.No</th>
<th>Category</th>
<th>Points</th>
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</thead>
<tbody>
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<td></td>
<td><strong>STATIC EVENTS - 500 POINTS</strong></td>
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<td>Design round</td>
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</tr>
<tr>
<td>2</td>
<td>Technical inspection</td>
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</tr>
<tr>
<td>3</td>
<td>Innovation</td>
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<td>4</td>
<td>Business plan</td>
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<tr>
<td>5</td>
<td>Safety equipment</td>
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</tr>
<tr>
<td>6</td>
<td>Cost report</td>
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</tr>
<tr>
<td>7</td>
<td>Vehicle stability</td>
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</tr>
<tr>
<td>8</td>
<td>Questionnaire</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td><strong>DYNAMIC EVENTS – 500 POINTS</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Brake Test</td>
<td>75</td>
</tr>
<tr>
<td>2</td>
<td>Acceleration</td>
<td>75</td>
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<tr>
<td>3</td>
<td>Autocross</td>
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<tr>
<td>4</td>
<td>Gradability</td>
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<tr>
<td>5</td>
<td>Range</td>
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<tr>
<td>6</td>
<td>Endurance Test</td>
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**TOTAL** 1000
## SECTION12
### EVENT PRIZES

#### 12.1 Static Test Prizes

<table>
<thead>
<tr>
<th>Category</th>
<th>Prize Amount</th>
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<tr>
<td>Design Winner</td>
<td>Rs 15,000/-</td>
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<tr>
<td>Design Runner</td>
<td>Rs 10,000/-</td>
</tr>
<tr>
<td>Best Innovation</td>
<td>Rs 5,000/-</td>
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<tr>
<td>Best Business Plan</td>
<td>Rs 5,000/-</td>
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</table>

#### 12.2 Dynamic Test Prizes

<table>
<thead>
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<th>Category</th>
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<tr>
<td>Overall Champion</td>
<td>Rs 60,000/-</td>
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<tr>
<td>First Runnerup</td>
<td>Rs 25,000/-</td>
</tr>
<tr>
<td>Second Runnerup</td>
<td>Rs 15,000/-</td>
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<tr>
<td>Best Range</td>
<td>Rs 10,000/-</td>
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<tr>
<td>Best Manoeuvrability</td>
<td>Rs 5,000/-</td>
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