Test and Evaluation plan:

1.

Mechanical Team: - Authenticate chassis durability and structural integrity under varying terrains. Specific tests are conducted to check it like the vibration tests etc. on different surfaces to assess resilience. Mechanical test scenarios encompass of rocky terrains, inclined surfaces and non-uniform surfaces and the environment factor controlled by simulation of harsh terrains and natural out door scenarios. Testing methodology there will be manual test using obstacles under controlled conditions and for such purposes the instruments that are needed (strain gauge, accelerometer, and deformation sensors). More over during mechanical tests data collection and analysis mostly incorporate stress strain measurement and deformation data under different conditions and evaluating structural weaknesses, fatigue point and overall chassis robustness.

2.

Electrical team:-The main objective is to verify functionality and efficiency of electrical systems, for which various number of tests are conducted like power consumption tests, voltage stability tests under the given scenario of the varying load. Environmental factors controlled settings mimicking fluctuating power sources encountered in the challenge. The specific methodology is the automated load testing with data logging for power consumption and voltage stability and the list of apparatus uses for this are multimeter, oscilloscope, and power analyzers for more accurate readings. Additionally here power consumption log and voltage stability readings under load are required and the analysis of which can be done by identifying power inefficiencies, voltage fluctuations and system stability.

3.

Autonomy & Robotics Integration (A&RI):- The major objective behind this domain is validating autonomous navigation, robotic arm functionality, and equipment servicing with detection tools. For this purpose the Specific Tests includes obstacle avoidance, robotic arm precision, and equipment detection and servicing tests. The environment for this test is stimulated scenarios, replicating challenges encountered during the competition. The basic approach is real-time sensor based hindrance detection, precision testing's for robotic arms and equipment servicing validation using equipment's Lidars, cameras, load cells, and specialized detection sensors for comprehensive assessments. Data collection comprises of Sensor data, arm manipulation precision, and equipment servicing success rates. And the analysis of which includes assessing navigation accuracy, arm control efficiency, and tool effectiveness.

4.

Iterating testing approach: - The iterative testing approach involves regular team meetings for feedback incorporation, resulting in software updates, structural enhancements, and electrical optimizations based on test feedback**.**