



LAWS OF MOTION

Rules on Team structure:

1. Maximum of 4 members in a team.
2. Members of a team may be from same college/school or different (School/UG/PG).
3. Any number of teams can participate from one college/school
4. Professionals are not allowed. Only students can participate.
5. Participants are required to get a bonafide certificate signed by the respective HoD/Dean/Principal in addition to their school/college ID Card.

Design Constraints:

1. **$T/W \leq 0.75$ without payload** (If excess thrust is measured, it will be neutralized by adding weight below the aircraft at center of gravity)
2. Propeller diameter should not be greater than 13 inches
3. Total wingspan should be a maximum of 1.2 m
4. Only electrical motors are allowed. The use of IC engines or any other means of providing thrust is prohibited.
5. Use of gyroscopes (gyros) and programming assistance in receivers is prohibited.

Abstract Submission

1. All the participants need to submit an abstract on their aircraft, which should be no longer than 15 pages (A4 size 1.5 line spacing) with standard formatting. The Abstract must document the basic design of the aircraft (dimensions, wing areas, velocity, etc.) and should also explain how their design is suitable for given problem.
2. Along with the abstract, participants also have to send a zip file containing at-least 5 and no more than 10 photographs of the aircraft while it is being built.
3. The Abstract has to be submitted as per the standard format(you can download the standard format from the respective IIT websites)
4. The Abstract has to be submitted to the respective Zonal competition 20 days in advance of the Zonal event date. E.g. For a Zonal happening on the 4th of January, the Abstract deadline is the 15th of December and so on.



Scope

Evaluation will be carried out in two rounds for the Zonals; a qualifier round and a maneuver round. The evaluation criteria and the constraints are listed in the problem statement. Teams qualifying to the Maneuver round in the Zonals will be reimbursed a limited amount for the costs incurred towards the expenses for procuring materials for their models.

Format of the Competition

The competition requires participants to design and fabricate an RC Aircraft (no readymade aircraft like RTF, ARF, BNF etc. are permitted) and perform a set of tasks. Propellers, Motors, ESC, Servos, Receiver and Transmitter are allowed as off-the-shelf items.

The zonal events will be conducted in 4 IITs (East Zone: IIT Kharagpur, West Zone – IIT Bombay, North Zone – IIT Kanpur and South Zone – IIT Madras). Participants can register at any of the four zonal competitions and bring their aircraft and all necessary equipment to participate. The arena will be an open ground. There will be two rounds in the competition

1. Qualifier Round
2. Competitive Round

A. Qualifier Round

A good measure of the design of an aircraft is in rate of climb and gliding time. In this round, participants are required to make their aircraft (without payload) to climb for 20 seconds. After this, they need to perform a dead stick flight (throttle=0 or Gliding). The aircraft however can be maneuvered while it is gliding.

The teams will be graded based on the glide time of the aircraft as mentioned below.

Scoring for Qualifier Round: 10* (glide time in seconds)

A maximum of up to 30 teams, based on the score, will qualify to Competitive Round from the Qualifier Round.

Along with qualification to next round, qualifying teams will get a reimbursement of INR 5000 per team towards material costs for their models



B. Competitive Round

In this round, the design w.r.t. to the payload handling capability of the aircraft is put to test.

The aircraft should carry one or more than one payloads (golf balls of weight - 45g, diameter - 43mm- will be supplied by the organizers during the competition) and drop them in a circular drop zone of 20m diameter. All the payloads in/on the aircraft should be released in a single drop.

The payloads should fall as independent objects and should not be put together as one bigger payload (sticking them together or putting payloads into a single box etc. are not allowed).

The drop zone is at a distance of 40m from the take-off and landing zone. (For a better understanding of the arena, refer to the illustrations).

The scoring for the Competitive round will be carried out based on the following formula.

Scoring Details

(Number of Payloads dropped in the drop zone) 2×100

As is evident from the scoring, high advantage is given to Aircraft that are designed to be capable of carrying and dropping multiple payloads in a single drop within the zone. No points for payloads that fall outside the dropping zone.

A maximum time of 4 minutes will be given between the first take off and the final landing. The maneuver can be performed multiple times within the time limit for additional points.

Entire payload should be released using only one channel in the transmitter.

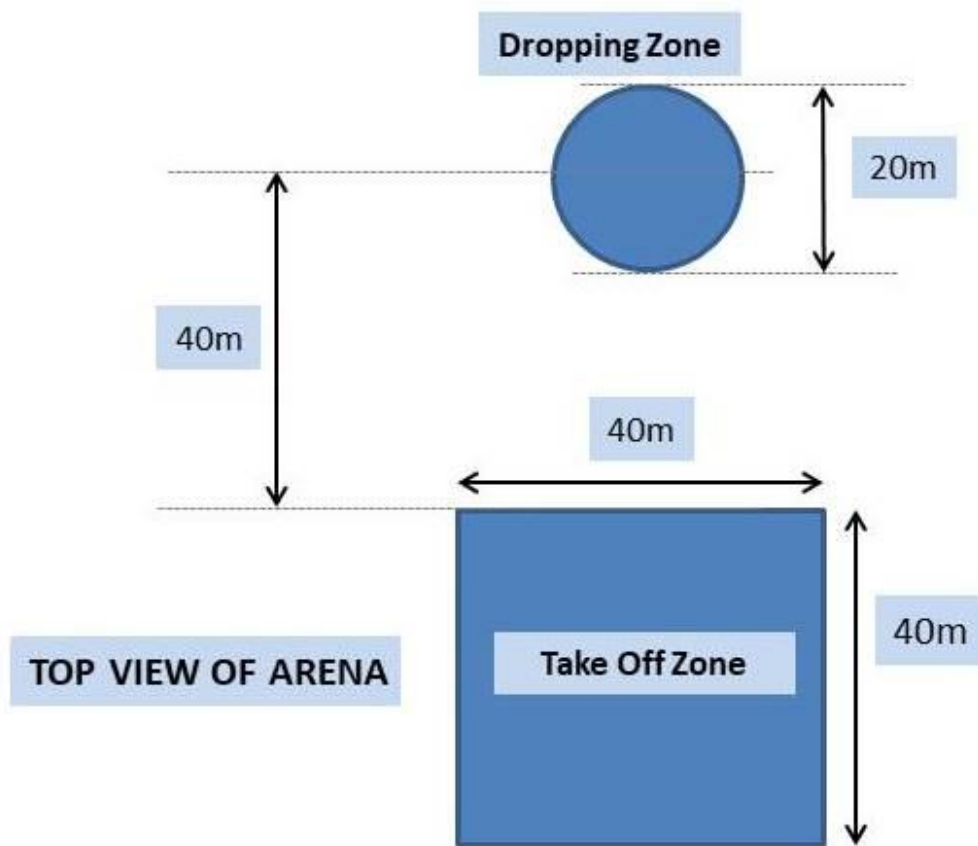
So, it is important to design the aircraft for quick loading (for multiple attempts) and quick releasing of payloads (to ensure they drop within the zone when released) in addition to the payload carrying capacity.

Partial dropping of payloads consecutively without reloading is not allowed. All payloads in the aircraft should be either released while dropping or removed from the aircraft and loaded again for next attempt.

Final Score

Final Score = Score from Qualifier round + Score from Competitive round

If there is a tie, winner will be decided by a separate round framed by the Judges on the spot. Judges' decisions would be considered final in all case.





Rules:

1. Each team would be given one attempt in Qualifier round and two attempts in Competitive Round and the best score is considered as per the scoring procedure mentioned above for each round.

If the aircraft does not take off in first attempt during qualifier round due to uncontrollable/ natural causes like sudden gusts of wind etc., they will be given second attempt then and there itself. This will be applicable only if the cause happens within the first 3 seconds of flight.

2. The timer will start the moment the participating team enters the take-off zone with the aircraft or within 30 seconds of previous team completing their attempt, whichever is earlier. The participants need to be prepared in time and launch without delay after entering the take-off zone.

Revisions

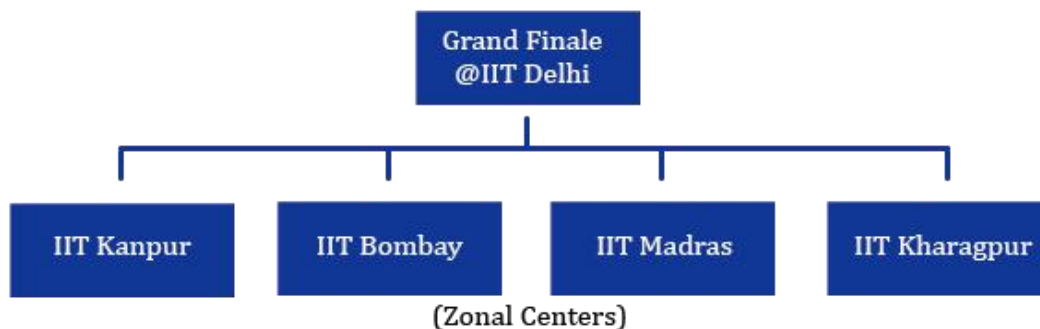
Any revisions to the Scope of the Competition would be intimated to all the participants via registered email and on the websites of the respective festivals at-least 45 days before the event takes place.

General Guidelines for the Competition

1. The use of 2.4 GHz radio is required for all aircraft competing in the competition.
2. A limited number of 2.4 GHz radios will be available with the organizers for use by the teams. Teams who do not have access to radios can inform the organizers in advance to request use of these radios.
3. Receivers installed in the aircraft must be in 'receiver mode only'.
4. All the systems (Servos, motor, etc.) will be checked by organizers for functionality before the competition. If found not working, teams will be dismissed from the competition.
5. Pilot can position himself at any point in the arena to fly the aircraft during the rounds.
6. In view of stringent safety requirements, if a pilot flies out of the designated flying zone which includes overhead of the event organizing and control section, as mentioned at the venue, he/ she is disqualified and has to immediately turn back and land at any cost.



7. Teams are suggested to carry additional components (motors, batteries, propellers etc.) as needed to avoid last minute surprises at the venue. You will lose time/ attempt if you are not ready at the time of your turn.
8. Metal propellers are not allowed.
9. Pilot should fly only using transmitter and receiver. FPV or any other devices that assist in flying are not allowed.
10. The models can have powered take-off with a landing gear or can be launched manually by a person standing at ground level.
11. Aircraft should be built from scratch by the participants of the team and should not be a purchased model.
12. A team member can't be a part of more than one team.
13. Teams can participate in more than one zonal event if they are not qualified for the finals already.
14. Teams that claimed reimbursement in one zonal event cannot claim in any other zonal event in case they are participating in more than one zonal event.
15. New members cannot be added to the teams who have been selected at Zonals to reach the Final Round.
16. Bring your college/student I-Card at the time of competition.
17. Any of the above-mentioned rules, if found violated, teams would not be allowed to participate in the competition.
18. Each team is advised to bring all components for their aircraft although they are coming from same college. Any delay due to sharing of components might result in your team losing the time available for your attempt or lose the entire attempt itself.





This would be a two-staged pan India Competition:

- Zonal Level: The Zonals would be held in conjunction with the Technical Festivals of IIT Bombay, IIT Kanpur, IIT Kharagpur and IIT Madras. The First three teams from each of the Zonal competitions, a total of 12 teams from the Zonal competitions, will participate in the National level.
- National Level: The National Level Competition will be held at IIT Delhi for all the toppers from the Zonal Round to decide the champion.