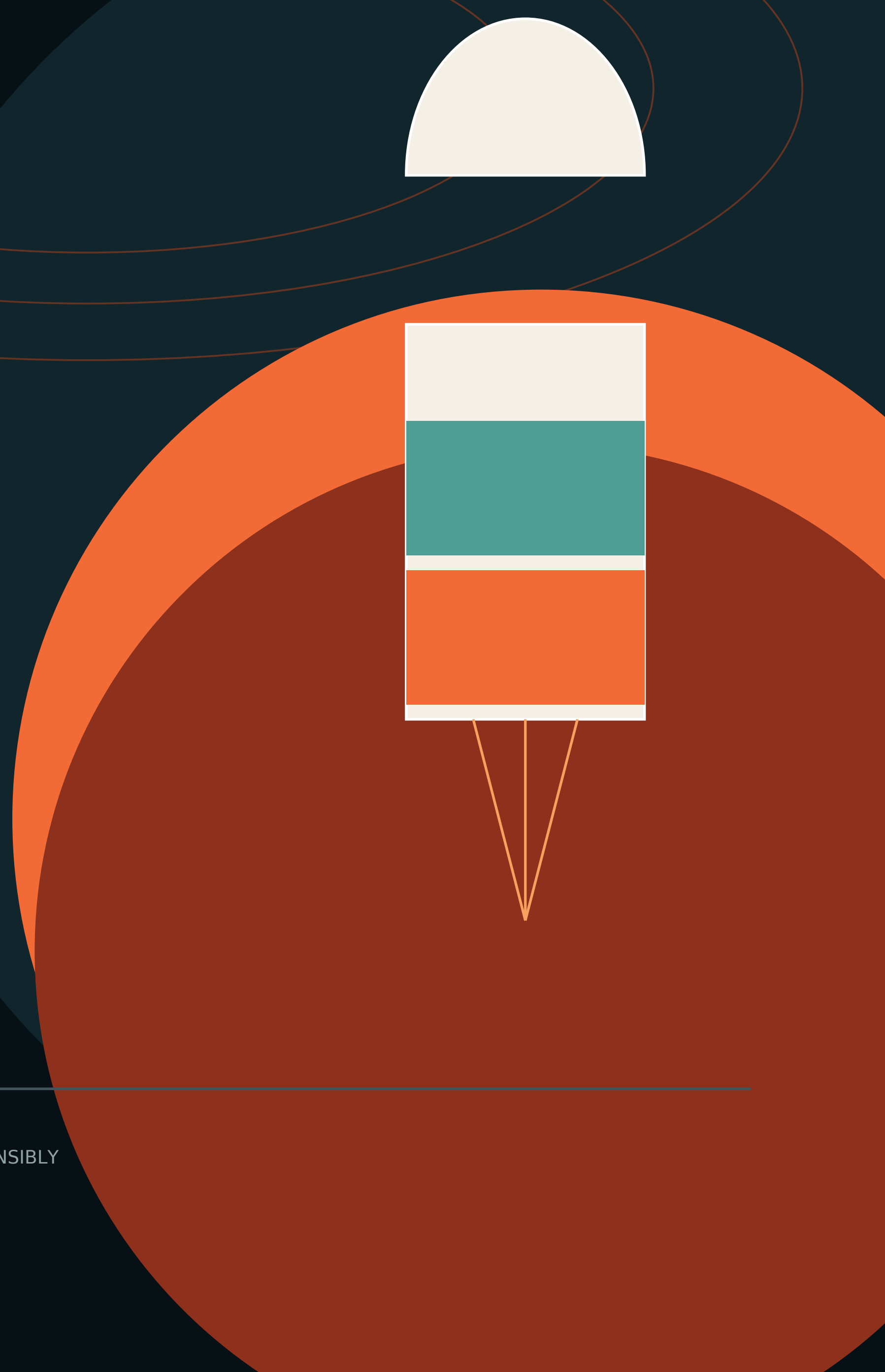
EV SOCIETY / SPACE WORKSHOP

MODEL ROCKETRY

Seven-Day Learning Workbook

Workshop on Essentials of Model Rocketry
24-30 August 2026 / Greater Noida
Educational companion for Team 2026-INSPACe-ROCKETRY-059



LEARN THE SYSTEM / BUILD THE EVIDENCE / FLY RESPONSIBLY

WORKBOOK PURPOSE

How to use this field companion

This workbook converts the published workshop syllabus into a learn-build-verify sequence. It is designed for engineering students preparing a model rocket for competition, while remaining useful to mentors and subsystem leads.

AUTHORITATIVE BOUNDARY

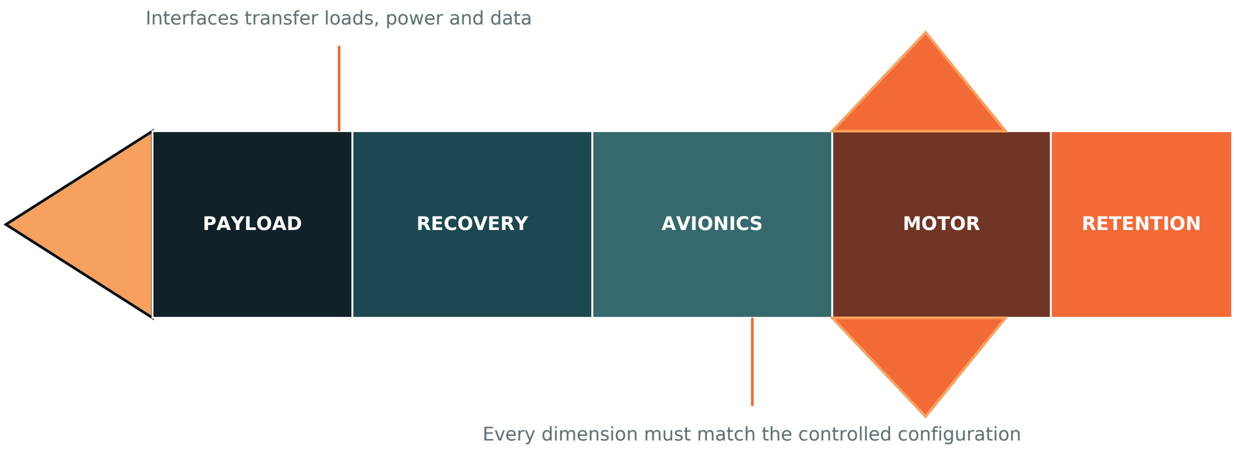
The workshop brochure is the source for schedule and topic coverage. The official competition rulebook, notices, range instructions and manufacturer datasheets remain authoritative for requirements and operational limits.

The team's CDR was reviewed only to identify the kinds of verification exercises a competition team needs. Team-specific motor values, dimensions, drawings, radio configuration, calculations and unresolved actions are intentionally excluded from this public workbook.

SAFETY BOUNDARY

Use certified commercial motors and authorised facilities. This workbook does not provide propellant formulations, motor-manufacturing instructions, pyrotechnic recipes or permission to perform energetic tests. Motor tests, ignition and launches require competent supervision, range authority, controlled access and the applicable legal approvals.

Learning loop



1. Learn	2. Decide	3. Build	4. Verify	5. Fly and learn
Understand physics and requirements	Record trade-offs and interfaces	Control configuration and workmanship	Test against a written criterion	Compare evidence with prediction

CONTENTS AND COVERAGE

One syllabus, seven days, ten systems

Every brochure lecture L1-L18 and practical P1-P9 is represented. The inaugural session and competition day complete the seven calendar-day journey.

Date	Brochure sessions	Workbook outcome
24 Aug	Inaugural: Journey of Indian Rockets Development	Mission brief, safety induction, roles and evidence plan
25 Aug	L1-L5; P1 Design and Fly	Configuration sketch, assumptions register and subsystem map
26 Aug	L6-L8; P2-P3 Design and Fly	Concept of Operations, deployment and launch-rail interfaces
27 Aug	L9-L12; P4 launch preparation; P5 simulations	Recovery sizing, motor-test literacy and baseline simulation
28 Aug	L13-L16; P6-P7 Design and Fly	Motor decision, inertial sensing and telemetry plan
29 Aug	L17-L18; P8 ANSYS; quiz; P9 practical	Integrated checkout and flight-readiness evidence pack
30 Aug	Competition preparation, presentation, flight and analysis	Flight report, anomaly review and improvement actions

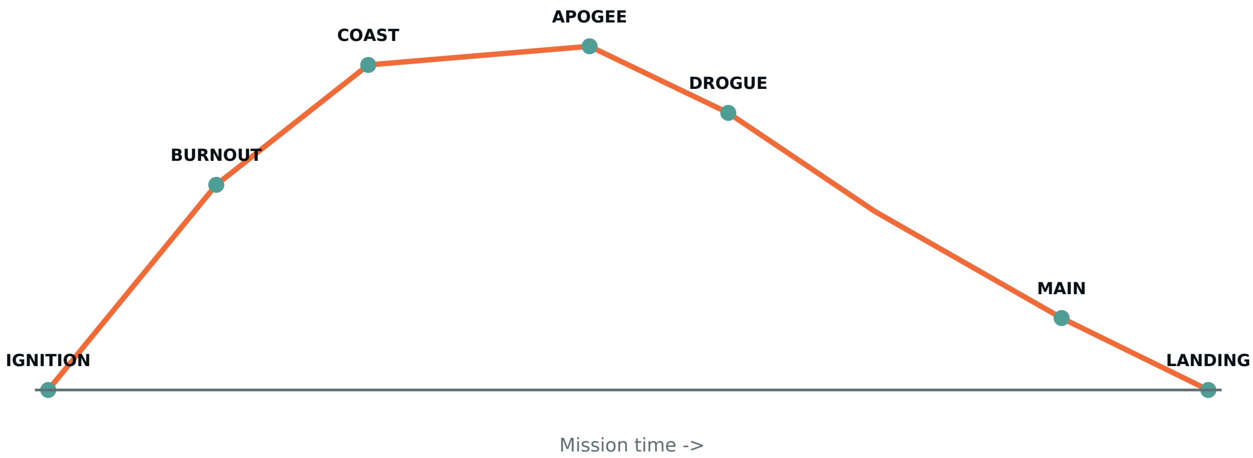
Coverage index

System	Brochure coverage
Foundations	L1, L5, inaugural keynote
Aerodynamics / structures	L2, L5, L14, L18, P8
Avionics / validation	L3, L4, L7, L10, L14, L17
Separation / recovery	L6, L9, L11
Propulsion / quality	L12, L13, L15
RF / communication	L16
Launch rail / operations	L8, P4, P6, competition day
Simulation / integration	P1-P9 and post-flight analysis

MODULE 01

Mission, requirements and fundamentals

Convert the mission into measurable requirements before choosing hardware.



Core ideas

- Identify mission objective, payload, target performance and recovery constraints.
- Describe powered ascent, burnout, coast, apogee, descent and landing.
- Maintain one controlled mass budget, power budget and requirement-compliance matrix.

Working relationships

Relationship / prompt	How to use it
Weight W = m g	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Average acceleration a = (T - W - D) / m	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Every value needs a source, unit, tolerance and owner.	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.

Common failure modes

- Treating the presentation as the design record.
- Using a requirement number without quoting its current authoritative text.
- Changing mass in one subsystem without updating trajectory, stability and recovery.

Evidence to retain

Mission brief; Concept of Operations; assumptions register; compliance matrix.

Apply: Mission, requirements and fundamentals

Prompt	Team response / evidence reference
What requirement or mission need does this work support?	
Which inputs are measured? Which are assumptions?	
What design decision was made, by whom and when?	
What calculation or model supports the decision?	
What is the pass/fail criterion?	
What evidence file proves the result?	
What remains open and who owns it?	

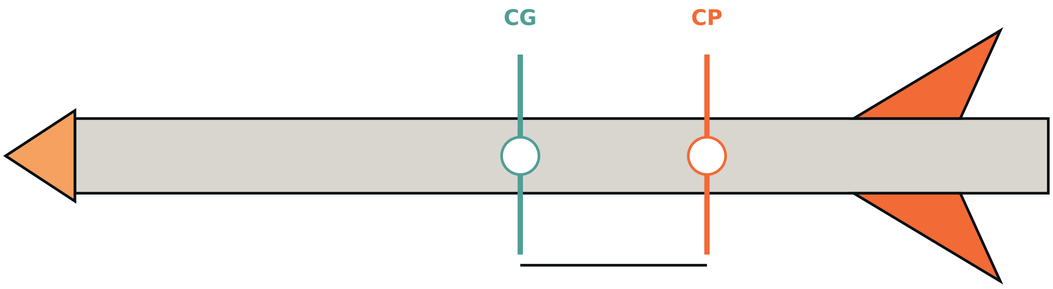
CALCULATION, SKETCH OR TEST OBSERVATION

Readiness check	Yes / No / N.A.	Reviewer / date
Units and sources are present		
Controlled configuration matches analysis		
Result is inside the required margin		
Independent review completed		

MODULE 02

Aerodynamics, stability and flight dynamics

A stable vehicle must leave the rail with adequate speed and retain acceptable margin through changing mass states.



STATIC MARGIN = (CP - CG) / BODY DIAMETER

Core ideas

- Separate skin-friction, pressure, base and interference drag.

- Track centre of gravity (CG) and centre of pressure (CP) for loaded and burnout states.

- Use simulations as models; validate their inputs and record versions.

Working relationships

Relationship / prompt	How to use it
Drag D = 0.5 rho V^2 Cd A	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Static margin = (CP - CG) / body diameter	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Rail-exit velocity is an output of mass, thrust curve, drag and usable rail length.	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.

Common failure modes

- Reporting only one CG/CP condition.

- Assuming a conventional-looking fin is automatically stable.

- Entering nominal masses while the vehicle is heavier in reality.

Evidence to retain

Measured CG table; CP method; stability plot; rail-exit result; wind cases.

MODULE 02 / WORKSHEET

Apply: Aerodynamics, stability and flight dynamics

Prompt	Team response / evidence reference
What requirement or mission need does this work support?	
Which inputs are measured? Which are assumptions?	
What design decision was made, by whom and when?	
What calculation or model supports the decision?	
What is the pass/fail criterion?	
What evidence file proves the result?	
What remains open and who owns it?	

CALCULATION, SKETCH OR TEST OBSERVATION

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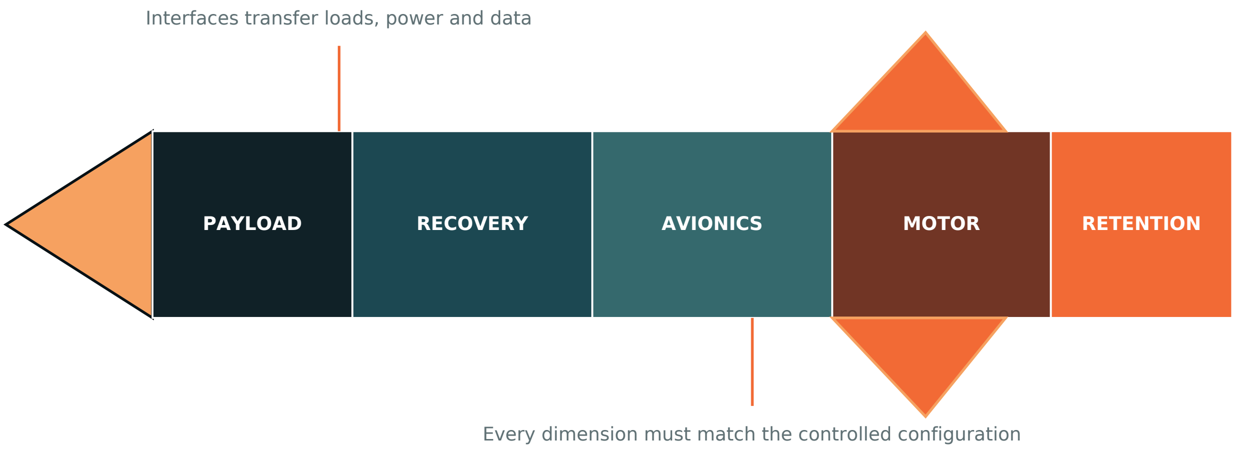
Independent review completed		

MODULE 03

Structures and mechanical integration

Structure is a continuous load path from thrust source to airframe and from recovery attachment to every separated body.



Core ideas

- Define axial, bending, pressure, handling and recovery-shock load cases.
- Use positive motor retention and inspectable structural joints.
- Control configuration through drawings, interfaces, tolerances and a Bill of Materials.

Working relationships

Relationship / prompt	How to use it
Normal stress sigma = F / A	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Factor of safety = allowable / predicted	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Shock load must be supported by test-correlated assumptions.	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.

Common failure modes

- Applying a safety factor to an uncertain or incorrect load.
- Checking tube strength but ignoring joints, holes or load introduction.
- Changing a drawing without updating the physical build record.

Evidence to retain

Load-case table; calculations/FEA; drawings; inspection sheet; interface control.

Apply: Structures and mechanical integration

Prompt	Team response / evidence reference
What requirement or mission need does this work support?	
Which inputs are measured? Which are assumptions?	
What design decision was made, by whom and when?	
What calculation or model supports the decision?	
What is the pass/fail criterion?	
What evidence file proves the result?	
What remains open and who owns it?	

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Independent review completed		

MODULE 04

Solid propulsion, motor selection and ignition

Use only authorised commercial motors and supplier data. Selection is a vehicle-level decision, not a propulsion-only choice.

Core ideas

- Read total impulse, thrust curve, burn time, peak thrust and motor mass from controlled data.

- Check liftoff thrust-to-weight, rail exit, acceleration, motor retention and structural interfaces.

- Design safe electrical continuity, arm and launch interlocks.

Working relationships

Relationship / prompt	How to use it
Total impulse I = integral of thrust over burn time	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Thrust-to-weight = thrust / (m g)	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Burnout mass = liftoff mass - consumed propellant mass.	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.

Common failure modes

- Mixing values from different motor variants.

- Using average thrust alone for rail-exit analysis.

- Allowing continuity checks to energise deployment or ignition circuits.

Evidence to retain

Supplier datasheet; motor decision record; retention drawing; authorised validation report.

Apply: Solid propulsion, motor selection and ignition

Prompt	Team response / evidence reference
What requirement or mission need does this work support?	
Which inputs are measured? Which are assumptions?	
What design decision was made, by whom and when?	
What calculation or model supports the decision?	
What is the pass/fail criterion?	
What evidence file proves the result?	
What remains open and who owns it?	

CALCULATION, SKETCH OR TEST OBSERVATION

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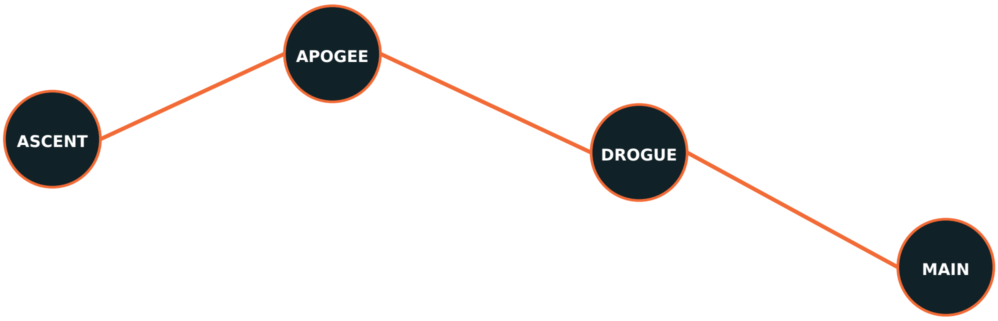
Independent review completed		

MODULE 05

Separation, descent and recovery

Recovery must protect people, payload and every vehicle section across credible failure cases.



Deployment sequence must define trigger, backup, hardware, energy source and verification evidence.

Core ideas

- Define the event sequence from ascent through safing after landing.
- Size drogue and main devices using verified descent mass and drag assumptions.
- Ground-test deployment, packing, harness, attachment points and backup logic.

Working relationships

Relationship / prompt	How to use it
Terminal velocity V = sqrt(2 m g / (rho Cd A))	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Recovery energy depends on mass, speed and deployment dynamics.	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Target rates and altitude gates must come from official competition requirements.	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.

Common failure modes

- Using liftoff mass for every descent phase.
- Claiming deployment success from a single uninstrumented test.
- Ignoring entanglement, line damage, separation clearance or wind drift.

Evidence to retain

Event sequence; sizing sheet; harness load path; packing record; deployment tests.

Apply: Separation, descent and recovery

Prompt	Team response / evidence reference
What requirement or mission need does this work support?	
Which inputs are measured? Which are assumptions?	
What design decision was made, by whom and when?	
What calculation or model supports the decision?	
What is the pass/fail criterion?	
What evidence file proves the result?	
What remains open and who owns it?	

CALCULATION, SKETCH OR TEST OBSERVATION

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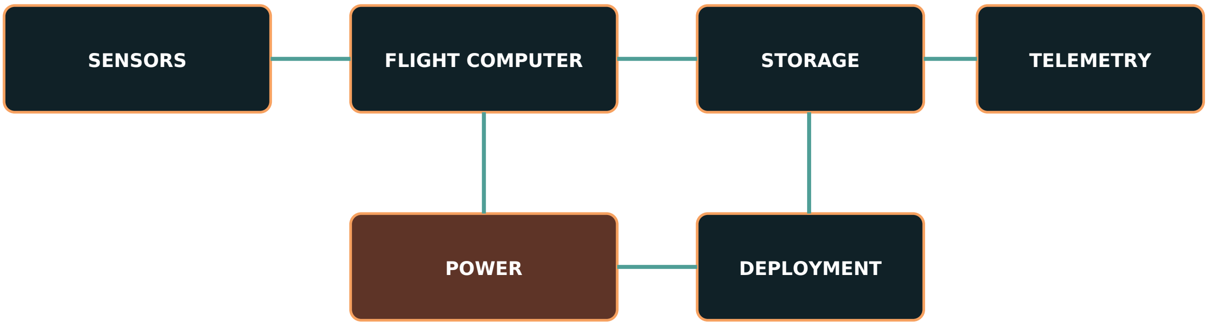
Units and sources are present		
Controlled configuration matches analysis		
Result is inside the required margin		
Independent review completed		

MODULE 06

Avionics, sensors, inertial systems and power

Avionics turn physical flight into measured states and controlled events; validation must cover the complete signal chain.



Separate sensing, decision, actuation and communication; verify every interface.

Core ideas

- Define sensor range, resolution, sample rate, calibration and failure response.

- Separate flight-state estimation from event actuation and from telemetry display.

- Budget peak current, energy, voltage margins and runtime with cold/aged battery cases.

Working relationships

Relationship / prompt	How to use it
Power P = V I	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Energy approximation = nominal voltage x amp-hours	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Sensor acceptance compares a known input with recorded output and tolerance.	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.

Common failure modes

- Choosing sensors by interface convenience alone.

- Testing code without the real wiring and deployment load.

- Ignoring brownout or reset behaviour during radio transmission and actuation.

Evidence to retain

Avionics block diagram; sensor matrix; power budget; calibration and HIL results.

Apply: Avionics, sensors, inertial systems and power

Prompt	Team response / evidence reference
What requirement or mission need does this work support?	
Which inputs are measured? Which are assumptions?	
What design decision was made, by whom and when?	
What calculation or model supports the decision?	
What is the pass/fail criterion?	
What evidence file proves the result?	
What remains open and who owns it?	

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Controlled configuration matches analysis		
Result is inside the required margin		
Independent review completed		

MODULE 07

RF, telemetry, data acquisition and ground station

Telemetry provides situational awareness and flight evidence; it must never be the only path to safe flight behaviour.

Core ideas

- Define packet fields, units, rate, sequence, timestamp and integrity check.

- Verify radio frequency, power and operation against current Indian rules and event permissions.

- Measure practical range with installed antennas and representative orientation.

Working relationships

Relationship / prompt	How to use it
Link margin = transmit power + gains - losses - receiver threshold	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Free-space path loss grows with frequency and distance	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Log raw data before dashboard transformation.	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.

Common failure modes

- Assuming a module's advertised range applies to the installed rocket.

- Sharing one ambiguous channel for telemetry and safety-critical commands.

- Displaying values without units, timestamps or invalid-data flags.

Evidence to retain

Radio configuration; link budget; packet definition; range test; ground-station checklist.

Apply: RF, telemetry, data acquisition and ground station

Prompt	Team response / evidence reference
What requirement or mission need does this work support?	
Which inputs are measured? Which are assumptions?	
What design decision was made, by whom and when?	
What calculation or model supports the decision?	
What is the pass/fail criterion?	
What evidence file proves the result?	
What remains open and who owns it?	

CALCULATION, SKETCH OR TEST OBSERVATION

Readiness check	Yes / No / N.A.	Reviewer / date
Units and sources are present		
Controlled configuration matches analysis		
Result is inside the required margin		
Independent review completed		

MODULE 08

Launch rail, site operations and mission checkout

The launch system constrains the rocket until aerodynamic controls become effective and keeps hazardous energy under range control.

Core ideas

- Match rail guides, clearance and usable rail length to the vehicle.

- Assess pad stability, direction, weather, people, property and recovery area.

- Use independent safe/arm, continuity, go/no-go and misfire procedures.

Working relationships

Relationship / prompt	How to use it
Usable rail length excludes geometry the vehicle cannot travel	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Rail exit must be simulated using the selected thrust curve and actual mass	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
No launch proceeds without range authority.	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.

Common failure modes

- Confusing total rail length with usable travel.

- Completing checks from memory instead of a signed checklist.

- Placing personnel downrange or approaching before the authorised safe interval.

Evidence to retain

Rail interface drawing; site plan; weather log; signed mission checkout.

Apply: Launch rail, site operations and mission checkout

Prompt	Team response / evidence reference
What requirement or mission need does this work support?	
Which inputs are measured? Which are assumptions?	
What design decision was made, by whom and when?	
What calculation or model supports the decision?	
What is the pass/fail criterion?	
What evidence file proves the result?	
What remains open and who owns it?	

CALCULATION, SKETCH OR TEST OBSERVATION

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Controlled configuration matches analysis		
Result is inside the required margin		
Independent review completed		

MODULE 09

Simulation, test and model correlation

Engineering confidence grows when analysis, bench tests, subsystem tests and flight data converge.

Core ideas

- Version every input: geometry, mass, CG, motor curve, atmosphere and recovery configuration.
- Run nominal, worst-case and sensitivity cases instead of one ideal trajectory.
- Define objective pass/fail criteria before each test.

Working relationships

Relationship / prompt	How to use it
Prediction error = measured - predicted	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Sensitivity = output change / input change	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Uncertainty must accompany results when inputs vary.	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.

Common failure modes

- Copying a screenshot without preserving the model file and inputs.
- Tuning a model after the test without recording what changed.
- Reporting a test as passed when acceptance criteria were written afterwards.

Evidence to retain

Simulation manifest; plots; test procedures; results; correlation and corrective actions.

MODULE 09 / WORKSHEET

Apply: Simulation, test and model correlation

Prompt	Team response / evidence reference
What requirement or mission need does this work support?	
Which inputs are measured? Which are assumptions?	
What design decision was made, by whom and when?	
What calculation or model supports the decision?	
What is the pass/fail criterion?	
What evidence file proves the result?	
What remains open and who owns it?	

CALCULATION, SKETCH OR TEST OBSERVATION

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Result is inside the required margin		
Independent review completed		

MODULE 10

Quality, safety and technical project management

A safe flight is the result of controlled work, independent checks and closed evidence - not last-minute confidence.

Core ideas

- Maintain BOM traceability, inspection status and non-conformance records.

- Use hazard analysis and FMEA to reduce risk before operation.

- Manage actions, dependencies, change approvals and readiness gates.

Working relationships

Relationship / prompt	How to use it
Risk priority is assessed from severity, likelihood and detectability using the team's defined method	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Verification answers whether a requirement was met	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.
Validation answers whether the system fulfils the mission need.	Record inputs with SI units; calculate; perform a reasonableness check; cite the source.

Common failure modes

- Closing an action because the due date arrived.

- Treating safety as one person's responsibility.

- Changing hardware after final checkout without controlled re-verification.

Evidence to retain

BOM; inspection records; hazard log; FMEA; action tracker; readiness evidence index.

Apply: Quality, safety and technical project management

Prompt	Team response / evidence reference
What requirement or mission need does this work support?	
Which inputs are measured? Which are assumptions?	
What design decision was made, by whom and when?	
What calculation or model supports the decision?	
What is the pass/fail criterion?	
What evidence file proves the result?	
What remains open and who owns it?	

CALCULATION, SKETCH OR TEST OBSERVATION

Readiness check	Yes / No / N.A.	Reviewer / date
Units and sources are present		
Controlled configuration matches analysis		
Result is inside the required margin		
Independent review completed		

24 AUG / ORIENTATION

Mission briefing

Learning focus

- Listen for the relationship between Indian rocket development, sounding-rocket missions and disciplined systems engineering.

- Establish team roles, safety expectations and one source of truth for requirements and configuration.

Team work

- Create a one-page mission brief.

- List all authoritative documents needed.

- Assign subsystem owners and independent reviewers.

Session / time	Key point learned	Decision or evidence produced

END-OF-DAY REFLECTION AND NEXT ACTIONS

25 AUG / DAY 1

Flight foundations

Learning focus

- L1: forces, rocket types and anatomy.

- L2: RASAero / FEAST views of aerodynamics and structure.

- L3-L4: avionics architecture and validation.

- L5: atmospheric rockets and aerodynamics.

- P1: first design-and-fly loop.

Team work

- Sketch the complete vehicle.

- Start mass and assumptions registers.

- Measure or plan measurement of CG.

- Define avionics verification layers.

Session / time	Key point learned	Decision or evidence produced

END-OF-DAY REFLECTION AND NEXT ACTIONS

Mission architecture

Learning focus

- L6: separation systems and deployment.
- L7: mission design and sensor systems.
- L8: launch-rail design.
- P2-P3: iterate the vehicle design.

Team work

- Draw the mission event sequence.
- Map sensors to decisions and evidence.
- Record rail interface and usable travel.
- Close at least one cross-subsystem interface.

Session / time	Key point learned	Decision or evidence produced

END-OF-DAY REFLECTION AND NEXT ACTIONS

Recovery and validation

Learning focus

- L9: separation mechanisms.
- L10: model-rocket power systems.
- L11: parachutes, streamers and winglets.
- L12: reading a static motor validation.
- P4-P5: launch preparation and simulation.

Team work

- Calculate recovery area from verified mass.
- Prepare a power budget.
- Run a controlled baseline simulation.
- Write one deployment test procedure.

Session / time	Key point learned	Decision or evidence produced

END-OF-DAY REFLECTION AND NEXT ACTIONS

28 AUG / DAY 4

Propulsion and communication

Learning focus

- L13: solid motors and propulsion principles.
- L14: inertial systems.
- L15: manufacturing-quality assurance concepts.
- L16: RF communication systems.
- P6-P7: preparation and integration.

Team work

- Complete the supplier-data motor decision record.
- Define sensor ranges and calibration.
- Draft telemetry packet fields and units.
- Plan an installed-antenna range test.

Session / time	Key point learned	Decision or evidence produced

END-OF-DAY REFLECTION AND NEXT ACTIONS

29 AUG / DAY 5

Integrate and qualify

Learning focus

- L17: launch-mission checkout.

- L18: configuration, assembly, integration and testing.

- P8: ANSYS mission / trajectory demonstration.

- Quiz and P9 final design-and-fly practical.

Team work

- Freeze the test configuration.

- Run integrated checkout in order.

- Collect the flight-readiness evidence index.

- Record quiz gaps as study actions.

Session / time	Key point learned	Decision or evidence produced

END-OF-DAY REFLECTION AND NEXT ACTIONS

Fly, recover and learn

Learning focus

- Prepare and present the mission.
- Execute the authorised flight procedure.
- Recover and safe the vehicle.
- Compare predicted and observed performance.
- Identify improvements without hiding anomalies.

Team work

- Sign the go/no-go record.
- Log event times and observations.
- Preserve raw telemetry.
- Write the post-flight report and corrective actions.

Session / time	Key point learned	Decision or evidence produced

END-OF-DAY REFLECTION AND NEXT ACTIONS

REUSABLE ENGINEERING RECORD

Requirement compliance matrix

Complete with controlled data. Attach calculations, photographs, plots or test logs by evidence reference. Do not erase anomalies; record disposition and re-verification.

Req. ID	Authoritative requirement text	Design response	Verification method	Evidence file	Owner / status

Prepared by / date	Independent review / date	Configuration or document version

REUSABLE ENGINEERING RECORD

Mass budget and CG states

Complete with controlled data. Attach calculations, photographs, plots or test logs by evidence reference. Do not erase anomalies; record disposition and re-verification.

Item / station	Measured mass	Tolerance	Axial station	Moment	Configuration

Prepared by / date	Independent review / date	Configuration or document version

REUSABLE ENGINEERING RECORD

Motor decision record

Complete with controlled data. Attach calculations, photographs, plots or test logs by evidence reference. Do not erase anomalies; record disposition and re-verification.

Candidate / data source	Impulse / thrust curve	Vehicle mass state	T/W and rail exit	Interfaces	Decision / reviewer

Prepared by / date	Independent review / date	Configuration or document version

REUSABLE ENGINEERING RECORD

Simulation manifest

Complete with controlled data. Attach calculations, photographs, plots or test logs by evidence reference. Do not erase anomalies; record disposition and re-verification.

Model file / version	Geometry source	Mass / CG state	Motor curve source	Atmosphere / wind	Result / plot

Prepared by / date	Independent review / date	Configuration or document version

REUSABLE ENGINEERING RECORD

Recovery sizing and test record

Complete with controlled data. Attach calculations, photographs, plots or test logs by evidence reference. Do not erase anomalies; record disposition and re-verification.

Flight state	Descent mass	Device / Cd / area	Predicted rate	Test criterion	Result / evidence

Prepared by / date	Independent review / date	Configuration or document version

REUSABLE ENGINEERING RECORD

Sensor and avionics verification

Complete with controlled data. Attach calculations, photographs, plots or test logs by evidence reference. Do not erase anomalies; record disposition and re-verification.

Function / sensor	Range / rate	Calibration input	Acceptance criterion	Recorded output	Result

Prepared by / date	Independent review / date	Configuration or document version

REUSABLE ENGINEERING RECORD

Power budget

Complete with controlled data. Attach calculations, photographs, plots or test logs by evidence reference. Do not erase anomalies; record disposition and re-verification.

Load / mode	Voltage	Average current	Peak current	Duration	Energy	Margin

Prepared by / date	Independent review / date	Configuration or document version

REUSABLE ENGINEERING RECORD

Telemetry and range test

Complete with controlled data. Attach calculations, photographs, plots or test logs by evidence reference. Do not erase anomalies; record disposition and re-verification.

Test condition	Radio / frequency approval	Antenna config	Distance / orientation	Packet result	Evidence

Prepared by / date	Independent review / date	Configuration or document version

REUSABLE ENGINEERING RECORD

Hazard and FMEA register

Complete with controlled data. Attach calculations, photographs, plots or test logs by evidence reference. Do not erase anomalies; record disposition and re-verification.

Hazard / failure mode	Cause	Effect	Controls	Verification	Owner / status

Prepared by / date	Independent review / date	Configuration or document version

REUSABLE ENGINEERING RECORD

Integration and change log

Complete with controlled data. Attach calculations, photographs, plots or test logs by evidence reference. Do not erase anomalies; record disposition and re-verification.

Date / configuration	Change	Reason	Affected analyses/tests	Approval	Re-verification

Prepared by / date	Independent review / date	Configuration or document version

REUSABLE ENGINEERING RECORD

Launch readiness record

Complete with controlled data. Attach calculations, photographs, plots or test logs by evidence reference. Do not erase anomalies; record disposition and re-verification.

Gate	Criterion	Evidence	Checker	Status / time

Prepared by / date	Independent review / date	Configuration or document version

REUSABLE ENGINEERING RECORD

Post-flight comparison

Complete with controlled data. Attach calculations, photographs, plots or test logs by evidence reference. Do not erase anomalies; record disposition and re-verification.

Metric / event	Predicted	Observed	Difference	Interpretation	Action

Prepared by / date	Independent review / date	Configuration or document version

FINAL FIELD RECORD

Flight-readiness gate

This checklist supplements - and never replaces - the official competition and range checklist.

No team member may use this page as authority to ignite or launch. The appointed range authority controls the operation.

Mechanical

Check	Result / evidence	Checker
Airframe and joints inspected; retention installed; rail guides aligned; recovery attachments verified; fasteners witnessed; payload restrained.		

Recovery

Check	Result / evidence	Checker
Devices packed to controlled procedure; harness routed; deployment channels checked safe; backups configured; ground-test evidence accepted.		

Avionics

Check	Result / evidence	Checker
Firmware version recorded; sensors calibrated; storage ready; clocks and units verified; battery secured; voltage and endurance accepted.		

Communication

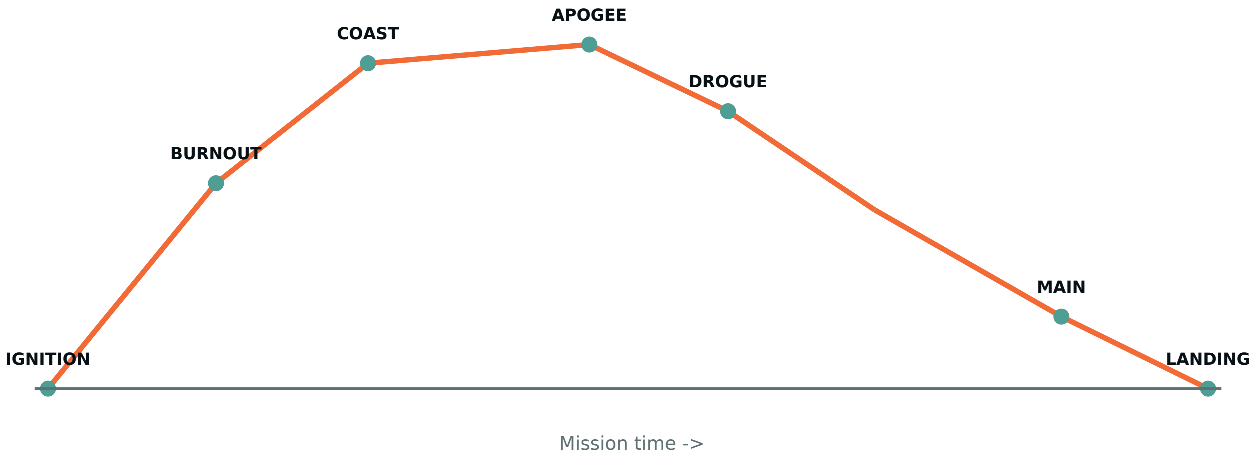
Check	Result / evidence	Checker
Frequency permission verified; radios configured; antennas installed; ground station logging; range evidence accepted; loss-of-link safe.		

Mission / range

Check	Result / evidence	Checker
Weather and site accepted; exclusion zone controlled; roles briefed; safe/arm sequence ready; misfire procedure understood; range authority gives final go.		

POST-FLIGHT

Learn without losing the evidence



Immediate sequence

- Follow range instructions before approaching or touching the vehicle.
- Safe the vehicle and document condition before disassembly.
- Preserve raw telemetry, ground logs, photographs, times and observer notes.
- Compare each event and performance metric against the versioned prediction.
- Open corrective actions for unexplained differences or damage.

Debrief prompts

Question	Team response
What happened, in mission-time order?	
Which predictions matched? Which did not?	
What evidence is missing or ambiguous?	
What change is justified?	
What must be re-verified before the next flight?	

FLIGHT NARRATIVE AND KEY LESSONS

REFERENCE

Glossary

Term	Brief meaning
Apogee	Highest point of the flight trajectory.
Burnout	Time at which the motor completes its powered burn.
CG	Centre of Gravity: balance point of the current mass configuration.
CP	Centre of Pressure: effective location of aerodynamic force.
Cd	Drag coefficient used with reference area and dynamic pressure.
ConOps	Concept of Operations: the intended mission sequence and roles.
DAQ	Data acquisition system used to measure and record signals.
FMEA	Structured review of failure modes, effects and controls.
HIL	Hardware-in-the-loop test connecting real hardware to simulated conditions.
Impulse	Integral of thrust over motor burn time.
IMU	Inertial Measurement Unit, typically accelerometers and gyroscopes.
NavIC	Indian regional satellite navigation system.
Static margin	Distance from CG to CP divided by body diameter.
Telemetry	Remote measurement data transmitted to a ground receiver.
Verification	Evidence that a specified requirement has been met.
Validation	Evidence that the system fulfils the intended mission need.

REFERENCE

Authoritative-source checklist

Obtain and version these sources before freezing competition-specific calculations.

Source	Why it is needed	Version / date / owner
Official competition rulebook and amendments	Requirements, limits, deliverables and scoring	
Official workshop/range instructions	Site, weather, safety and operational control	
Selected motor manufacturer datasheet and certified thrust curve	Mass, dimensions, impulse, thrust and installation constraints	
Material and component datasheets	Allowables, ratings, interfaces and tolerances	
Radio and spectrum permissions	Permitted frequencies, power and operational conditions	
Controlled CAD, BOM and wiring diagrams	As-built configuration baseline	
Simulation model files and input manifest	Reproducible predictions	
Approved test procedures and reports	Objective verification evidence	

Publication note

This workbook is an independent educational aid prepared from the supplied workshop brochure. Names of organisations and programme identifiers are used only to describe context. No endorsement, certification, partnership or official status is implied.

Team commitment

We will use current authoritative requirements, preserve evidence, report anomalies honestly and follow authorised range-safety decisions.
Team lead signature / date:
Safety lead signature / date:
Faculty / mentor review / date: