

Drone Safety and Regulations

DI05000081: Drone Technology — Unit 5

Drone Technology

Gujarat Technological University

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Topics Covered in Unit 5

- 1 **Drone safety guidelines**
- 2 **Pre-flight checklist**
- 3 **Common failures and troubleshooting**
- 4 **Airspace awareness and safe flying**
- 5 **Drone regulations in India**
- 6 **Role of DGCA**
- 7 **No-fly zones: Red, Yellow, Green zones**
- 8 **Digital Sky platform**

Why Regulations Matter

- Drones can injure people if they crash
- Interference with manned aircraft is deadly
- Privacy violations are a serious concern
- National security implications near airports / defence

Safety First!

Know the Rules

Fly Responsibly

5.1 Drone Safety Guidelines

General Safety Rules

- Always **fly within visual line of sight (VLOS)**
- Never fly **above 120 m AGL** without clearance
- Maintain **safe distance from people**: min 50 m
- Never fly **near airports**: 5 km exclusion zone
- Do not fly **over crowds, events, or religious places**
- Check **weather**: avoid wind > 20 km/h, rain, fog
- Always set **Return-to-Home** altitude before

Emergency Procedures

- Signal loss** RTH activates automatically if set
- Low battery** Land immediately; do not push limits
- Motor failure** Attempt to land in open area
- Flyaway** Cut throttle; use failsafe

Altitude



5.2 Pre-Flight Checklist

Before Every Flight — IMSAFE

Illness Pilot fit to fly? Not tired/sick

Medication Any drugs that affect judgement?

Stress Pilot calm and focused?

Alcohol Zero alcohol rule

Fatigue Rested? Not flying after night shift

Emotion Not distracted by personal issues

Drone Pre-Flight Checklist

- ☐ Propellers firmly attached, no cracks
- ☐ Battery fully charged, no swelling
- ☐ Motors spin freely, no grinding
- ☐ GPS lock acquired (≥ 6 satellites)
- ☐ Home point set correctly
- ☐ RTH altitude configured
- ☐ Failsafe settings verified
- ☐ RC transmitter and receiver bound
- ☐ Compass calibrated (if prompted)
- ☐ Area clear of people and obstacles
- ☐ NOTAM / DGCA permission obtained

5.3 Common Drone Failures and Troubleshooting

Common Failures and Causes

Failure	Likely Cause	Action
Drone won't arm	Compass error, GPS	Calibrate
Oscillation	PID gains too high	Retune
Motor not spinning	ESC fault/wiring	Check w
Flyaway	Compass interference	Recalibr
Short flight time	Battery age/cold	Replace,
Video glitch	5.8 GHz interference	Change
GPS drift	Weak satellite signal	Wait for
Toilet bowl effect	Poor compass calib.	Full com

Crash Protocol

1

Ensure area is safe; do not rush to crashed drone

2

Check for **Li-Po damage** (swelling, smoke)

3

Disconnect battery **immediately**

4

Inspect propellers, arms, landing gear

5

Review **black box / flight log** in GCS

6

Fix root cause before next flight

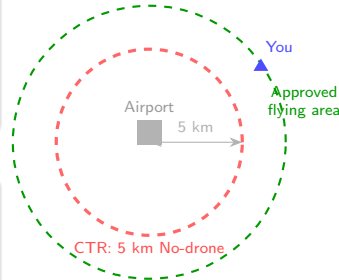
5.4 Airspace Awareness — Safe Flying Practices

Understanding Airspace

- Airspace is divided into **classes** (A–G) by ICAO
- Drone pilots must be aware of **controlled** vs **uncontrolled** airspace
- Near airports: **CTR (Control Zone)** extends 5 nm radius
- **NOTAMs** (Notice to Airmen): temporary restrictions for events, emergencies

Safe Flying Practices

- Always check **Digital Sky** or **DroneAcharya** app before flying
- Maintain **visual contact** with drone at all



5.5 Drone Regulations in India

Key Regulatory Milestones

Year	Regulation
2018	Civil Aviation Requirements (CAR) for RPAS
2021	Drone Rules 2021 (simplified, liberalised)
2021	Drone Certification Scheme introduced
2022	Drone (Amendment) Rules 2022
2022	Drone Shakti initiative by MoCA

Drone Rules 2021 — Key Requirements

- **Registration** of drones on Digital Sky
- **Unique Identification Number (UIN)**
- **Remote Pilot Certificate (RPC)** for commercial operators

Key Terms

RPAS Remotely Piloted Aircraft System

RPC Remote Pilot Certificate (licence)

UIN Unique Identification Number

UAOP UA Operator Permit (for commercial ops)

Type Cert. Airworthiness approval from DGCA

Simplified Post-2021

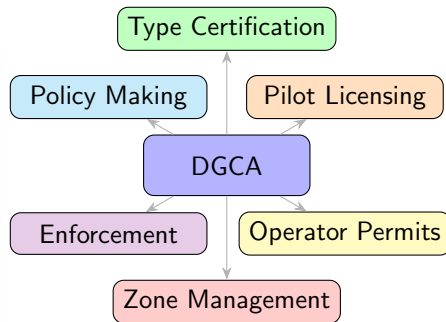
5.6 Role of DGCA

Directorate General of Civil Aviation (DGCA)

The DGCA is India's **national civil aviation authority** under the Ministry of Civil Aviation. It regulates civil aviation safety including drone operations.

DGCA's Roles for Drones

- **Type Certification:** Approves drone models as airworthy
- **Pilot Licensing:** Issues Remote Pilot Certificates (RPC)
- **Operator Permits:** Issues UAOP for commercial operations
- **Airspace Management:** Designates



5.7 No-Fly Zones — Red, Yellow, Green Zones

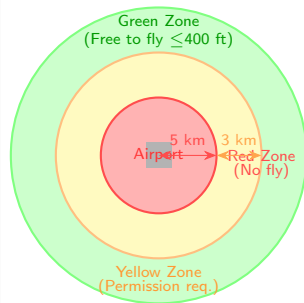
Airspace Zone Classification (India)

Red Zone **Flying prohibited.** Requires explicit permission from defence/security authorities. Examples: Airport perimeter, defence areas, border zones, nuclear plants, Vijay Chowk

Yellow Zone **Permission required** from AAI/Air Traffic Control before flying. Examples: 8–12 km from airport boundary, controlled airspace

Green Zone **Automatic permission** up to 400 ft AGL. No prior approval needed.

Examples: Rural areas, open fields

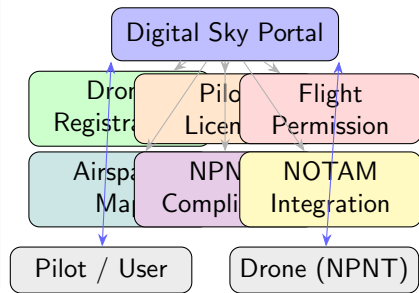


5.8 Digital Sky Platform

What is Digital Sky?

Digital Sky is India's **online platform** developed by DGCA under the Ministry of Civil Aviation for:

- **Drone registration** and UIN issuance
- **Remote Pilot Licence** application and management
- **Flight permission** requests (for Yellow/Red zones)
- **Interactive airspace map** (zone visualisation)
- **NPNT compliance**: drone checks permission automatically before arming



Unit 5 — Summary and Course Wrap-Up

Unit 5 Key Takeaways

- Always follow **safety guidelines**: VLOS, 120m limit, no crowds
- Complete **pre-flight checklist** before every flight
- Know common **failures**: oscillation, flyaway, low battery
- India's airspace: **Red** (no fly), **Yellow** (permission), **Green** (free)
- **DGCA** regulates type certification, licensing, operations
- **Digital Sky** is the one-stop portal for all drone compliance

Complete Course Summary

Unit	Theme
1	Intro, history, classification
2	Components: motors, ESC, battery
3	FC, sensors, PID control
4	Communication, telemetry, GCS
5	Safety and regulations

Review Questions

- ① What are Red, Yellow, Green zones?
- ② What is DGCA and what are its roles?