



**Skill India**  
कौशल भारत - कुशल भारत



सत्यमेव जयते  
GOVERNMENT OF INDIA  
MINISTRY OF SKILL DEVELOPMENT  
& ENTREPRENEURSHIP



# Facilitator Guide



Sector  
Telecom

Sub-Sector  
Network Managed Services

Occupation  
Network Operation and Maintenance

Reference ID: TEL/Q6221, Version 1.0  
NSQF level 3

## Dron-O- Grapher

**This book is sponsored by**

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**Shri Narendra Modi**  
Prime Minister of India

“

Skill development of the new generation is a national need and is the foundation of Aatmnirbhar Bharat

”





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The preparation of this guide would not have been possible without the telecom industry's support. Industry feedback has been extremely beneficial since inception to conclusion, and it is with the industry's guidance that we have tried to bridge the existing skill gaps in the industry. This facilitator guide is dedicated to the aspiring youth, who desire to achieve special skills that will be a lifelong asset for their future endeavours.

## About this Guide

The facilitator guide (FG) for Dron-O-Grapher is primarily designed to facilitate skill development and training of people, who want to become professional Dron-O-Grapher in various stores. The facilitator guide is aligned to the Qualification Pack (QP) and the National Occupational Standards (NOS) as drafted by the Sector Skill Council (TSSC) and ratified by National Skill Development Corporation (NSDC).

It includes the following National Occupational Standards (NOSs)-

1. TEL/Q6263: Operate drone and camera accessories
2. TEL/Q6264: Perform post processing and editing of photographs and footages
3. TEL/Q6265: Preventive maintenance and troubleshooting of drones and related accessories
4. TEL/Q6266: Use drone photography in various sectors
5. DGT/VSQ/N0102: Employability Skills (60 Hours)

Post this training, the participants will be able to perform tasks as professional Dron-O-Grapher. We hope that this Facilitator Guide provides a sound learning support to our young friends to build a lucrative career in the Telecom Skill Sector of our country.

## Symbols Used



Ask



Explain



Elaborate



Notes



Objectives



Do



Demonstrate



Activity



Team Activity



Facilitation Notes



Practical



Say



Resources



Example



Summary



Role Play



Learning Outcomes

## Table of Contents

S. No	Modules and Units	Page No
1.	<b>Introduction to the Role of a Dron-o-Grapher (Bridge Module)</b>	<b>1</b>
	Unit 1.1 - Industry Overview and Organisational Context	3
	Unit 1.2 - Role and Responsibilities of a Dron-o-Grapher	5
2.	<b>Operate Drone and Camera Accessories (TEL/N6263)</b>	<b>9</b>
	Unit 2.1 - Pre-Flight Checks and Preparations	11
	Unit 2.2 - Drone Operation and Footage Capture	14
3.	<b>Perform Post Processing and Editing of Photographs and Footage (TEL/N6264)</b>	<b>19</b>
	Unit 3.1 - Optimizing Computer and Software for Editing Tasks	21
	Unit 3.2 - Editing Techniques and Software Utilization	24
	Unit 3.3 - File Management and Data Backup	27
4.	<b>Preventive Maintenance and Troubleshooting of Drones and Related Accessories (TEL/N6265)</b>	<b>31</b>
	Unit 4.1 - Identifying and Diagnosing Drone Issues	33
	Unit 4.2 - Preventive Maintenance and Repair of Drones	36
5.	<b>Use Drone Photography in Various Sectors (TEL/N6266)</b>	<b>41</b>
	Unit 5.1 - Applications of Drone Photography in Real Estate, Agriculture and Media	43
	Unit 5.2 - Specialized Drone Applications	46
6.	<b>Employability Skills (DGT/VSQ/N0102) (60 Hrs.)</b>	<b>51</b>
	Employability Skills is available at the following location :	
	<a href="https://www.skillindiadigital.gov.in/content/list">https://www.skillindiadigital.gov.in/content/list</a>	
	Scan the QR code below to access the ebook	



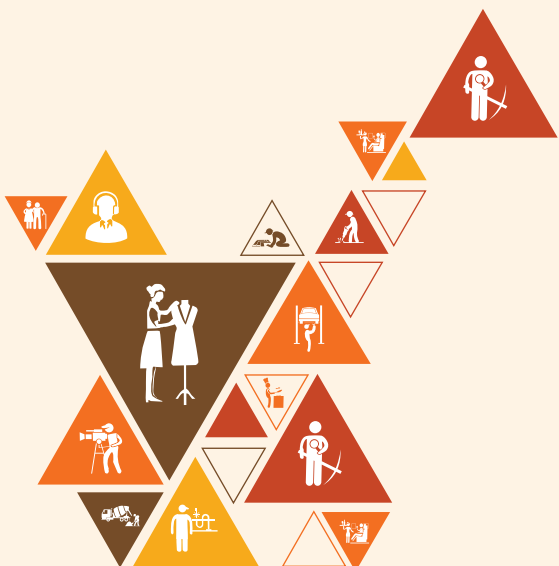




# 1. Introduction to the Role of a Dron-o-Grapher

Unit 1.1 - Industry Overview and Organisational Context

Unit 1.2 - Role and Responsibilities of a Dron-o-Grapher



Bridge Module

## Key Learning Outcomes



By the end of this module, the participants will be able to:

1. Discuss the job role of a Dron-o-Grapher.
2. Explain the scope of work for a Dron-o-Grapher.

## Unit 1.1: Industry Overview and Organisational Context

### Unit Objectives

By the end of this unit, the participants will be able to:

1. Describe the size and scope of the Telecom industry and its sub-sectors.
2. Discuss the contribution of the Telecom Sector Skill Council to India's skill ecosystem.
3. Discuss the organisational policies on workplace ethics, managing sites, quality standards, personnel management, and public relations (PR).
4. Describe the process workflow in the organisation.

### Resources to be Used

Whiteboard, markers, projector, laptop, printed handouts on the telecom industry, telecom industry reports, Telecom Sector Skill Council (TSSC) documents, organisational policies on workplace ethics, sample process workflow charts, and videos related to the telecom industry.

### Say

- "Good morning, everyone! I'm excited to have you here for today's session!"
- "Today, we will explore the industry overview and organisational context, with a focus on understanding the telecom sector and its processes."
- "Understanding the telecom industry's scope and the organisational policies in this field will help you adapt to and thrive in the workplace."

### Ask

- "What are some examples of telecom companies or services you use daily?"
- "Can anyone share an experience where a workplace policy made a significant difference in how work was done?"
- "What do you think is the role of workplace ethics in a successful organisation?"

### Do

- Introduce the telecom industry and its sub-sectors with the help of a presentation.
- Discuss the contribution of the Telecom Sector Skill Council to India's skill ecosystem.
- Explain organisational policies on workplace ethics, managing sites, quality standards, personnel management, and public relations (PR).
- Describe a typical process workflow in a telecom organisation, using a diagram for clarity.

## Elaborate

- Explain the size and scope of the Telecom industry, highlighting its various sub-sectors such as mobile services, broadband, and network infrastructure.
- Discuss the role of the Telecom Sector Skill Council (TSSC) in developing a skilled workforce in the telecom sector and its contributions to India's skill ecosystem.
- Describe key organisational policies, including workplace ethics, site management, quality standards, personnel management, and public relations.
- Illustrate the process workflow within a telecom organisation, from customer enquiry to service delivery.

## Demonstrate

Show a video explaining the functioning of a telecom company, focusing on its sub-sectors, organisational policies, and process workflow.

## Activity

1. **Activity Name:** Telecom Industry Mapping
2. **Objective:** To understand the size and scope of the telecom industry and its sub-sectors.
3. **Type of Activity:** Group
4. **Resources:** Whiteboard, markers, printed telecom industry reports.
5. **Time Duration:** 25 minutes
6. **Instructions:**
  - Divide the participants into groups of 4-5 members.
  - Ask each group to map out the telecom industry, categorising its sub-sectors (mobile services, broadband, infrastructure, etc.) on a whiteboard.
  - After 15 minutes, ask each group to present their map, explaining the importance of each sub-sector.
  - Engage in a brief discussion about how the sub-sectors contribute to the overall telecom industry.
7. **Outcome:** Participants will gain a clear understanding of the telecom industry's structure and how its sub-sectors work together.

## Notes for Facilitation

- Keep the session interactive by encouraging participants to share their thoughts on the telecom industry and its real-life applications.
- Use real-world examples from well-known telecom companies to make the concepts more relatable.
- For the topic of organisational policies, ensure that participants understand the importance of workplace ethics in maintaining a positive work environment.
- When explaining the process workflow, emphasise how each step is interconnected and why it's important for smooth operations.
- During discussions on TSSC, highlight how skill development impacts career opportunities in the telecom industry.



## Unit 1.2: Role and Responsibilities of a Dron-o-Grapher

### Unit Objectives

By the end of this unit, the participants will be able to:

1. Illustrate the drone technology.
2. Discuss the DGCA guidelines for drones.
3. Discuss the role and responsibilities of a Dron-o-Grapher.
4. Identify various employment opportunities for a Dron-o-Grapher.
5. List the various daily, weekly, and monthly operations/activities that take place at the site under a Dron-o-Grapher.

### Resources to be Used

Laptop, projector, DGCA drone guidelines document, drone (or images/videos of drones in action), whiteboard, markers, flip chart, handouts of the Dron-o-Grapher job description, internet access for reference, safety equipment for drone operations, example video of drone photography.

### Say

- “Hello everyone, welcome to today’s session! I’m excited to explore the world of drone technology with you all.”
- “In today’s session, we’re going to look at the role and responsibilities of a Dron-o-Grapher, an emerging field with lots of exciting career opportunities.”
- “Understanding the duties of a Dron-o-Grapher is important because drones are revolutionizing industries, and you’ll be at the forefront of this technological shift.”

### Ask

- “How many of you have ever seen a drone in action, and what was the purpose of its use?”
- “Can you think of any industries that might use drones for their work?”
- “What kind of skills or responsibilities do you think someone operating a drone should have?”

### Do

- Begin with an introduction to drone technology and its applications.
- Show videos of drones being used in different fields (such as photography, agriculture, construction, etc.).

- Discuss DGCA guidelines and why they are crucial for safe drone operation.
- Explain the responsibilities of a Dron-o-Grapher in detail, breaking it down into daily, weekly, and monthly activities.
- Walk through employment opportunities available for drone photographers.
- Engage the participants by asking them to share their thoughts on how drones are changing industries.

## Elaborate



- Understand the mechanics and capabilities of drones, including types, uses, and innovations.
- Learn the legal framework and regulatory guidelines that ensure the safe operation of drones in India.
- Understand the daily tasks, technical skills required, and responsibilities of operating drones for various industries.
- Discover how different sectors use drone technology and where Dron-o-Graphers can find work.
- Explore the types of tasks and operational protocols Dron-o-Graphers follow in different environments.

## Demonstrate



Demonstrate the basic setup and operation of a drone, including takeoff, flight controls, and landing procedures. Highlight key safety precautions during drone operations.

## Activity



1. **Activity Name:** Drone Photography in Action
2. **Objective:** To understand the practical aspects of drone photography and its role in various industries.
3. **Type of activity:** Group
4. **Resources:** Drone (or images/videos of drone photography), laptop, projector, flip chart.
5. **Time Duration:** 30 minutes
6. **Instructions:**
  - Divide the participants into small groups.
  - Show a video of a drone in action capturing photography or footage for a specific industry (e.g., agriculture, construction, or film).
  - Ask each group to brainstorm potential challenges and benefits of using drones in that industry.
  - Have each group share their thoughts on the opportunities and responsibilities of a Dron-o-Grapher in that field.
7. **Outcome:** Participants will gain an understanding of how drone photography is applied across various industries and the responsibilities associated with it.

## Notes for Facilitation

- Encourage participants to engage with the demonstration and ask questions about drone technology.
- Make sure to emphasize safety protocols when operating drones, aligning with DGCA guidelines.
- Relate the role of a Dron-o-Grapher to real-world scenarios, like filming a movie scene or surveying agricultural land.
- Highlight the importance of maintaining high standards in drone operations for professional success.
- Make sure to explain that Dron-o-Graphers need to have technical, creative, and regulatory knowledge to succeed.
- Connect the operational tasks of a Dron-o-Grapher to the practical scenarios they might encounter in different industries.

## Answers to Exercises for PHB

### Multiple Choice Questions:

1. a. BharatNet
2. c. Carbon fiber
3. c. Hybrid drones (VTOL)
4. c. 400 feet
5. c. Navigates the drone back to the starting point

### Descriptive Questions:

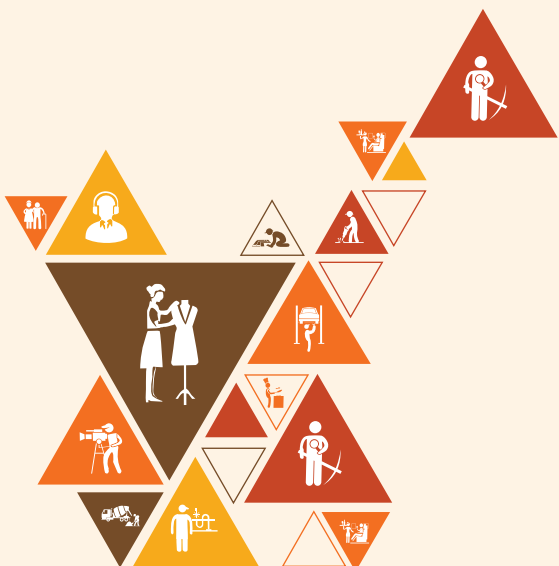
1. Refer Unit 1.1.1 Size and scope of the Telecom Industry and its Sub-Sectors
2. Refer Unit 1.1.2 Contribution of Telecom Sector Skill Council in India's Skill Ecosystem
3. Refer Unit 1.2.1 Introduction to Drone Technology
4. Refer Unit 1.2.1 Introduction to Drone Technology
5. Refer Unit 1.2.3 DGCA Guidelines for Drones



## 2. Operate Drone and Camera Accessories

Unit 2.1 - Pre-Flight Checks and Preparations

Unit 2.2 - Drone Operation and Footage Capture



TEL/N6263

## Key Learning Outcomes



By the end of this module, the participants will be able to:

1. Describe the process of pre-operation checks conducted before a drone flight.
2. Illustrate the process of conducting drone flight operations.
3. Demonstrate the process of capturing drone video and aerial photography.

## Unit 2.1: Pre-Flight Checks and Preparations

### Unit Objectives

By the end of this unit, the participants will be able to:

1. Show how to power on and off a drone and remote controller, following proper procedures.
2. Perform a pre-flight inspection of a drone, including checking the battery, propellers, and flight controls.
3. Demonstrate the procedure to calibrate the GPS and compass of a drone to ensure accurate positioning and navigation.
4. Show how to inspect and adjust the camera and gimbal of a drone for proper alignment and functionality.
5. Show how to operate a remote controller and verify the responsiveness of control sticks, buttons, and switches.
6. Demonstrate the process of inserting a memory card or other storage devices in the drone and manage the drone's storage.
7. Update the firmware and companion software of a drone and connected devices.
8. Analyse weather conditions and restrictions to determine the feasibility of drone flight.

### Resources to be Used

Drones, remote controllers, batteries, propellers, flight controls, GPS, compass, camera, gimbal, memory cards, storage devices, firmware update tools, weather data tools, charts, and companion software.

### Say

- Welcome, everyone! I'm excited to dive into today's session where we'll be learning about the essential pre-flight checks and preparations for operating drones.
- Today, our objective is to understand how to ensure our drones are in optimal condition before takeoff, covering everything from powering up to performing safety checks and calibrations.
- Understanding pre-flight checks is crucial because it ensures your safety, maximises the efficiency of the flight, and prevents costly mistakes.

### Ask

- Have you ever had to check equipment before starting an activity or task? What was involved?
- Can anyone think of a time when they missed an important step before starting something, and it caused an issue?
- What kind of weather conditions do you think are important when flying a drone?

## Do

- Start by introducing the concept of pre-flight checks and their importance in ensuring safe drone operation.
- Explain each topic of the session, step-by-step, providing practical examples.
- Emphasise the need for thoroughness when performing checks and calibrations before flight.
- Engage participants by asking questions related to each step to make sure they grasp the concepts clearly.
- Have participants follow along with the demonstrations of powering on the drone and controller, performing inspections, and calibrating devices.
- Provide practical exercises on adjusting camera and gimbal settings.
- Walk them through the process of updating firmware and checking weather conditions for flight feasibility.

## Elaborate

- Power on and off the drone and remote controller following proper procedures to avoid damaging the system.
- Perform a pre-flight inspection of the drone, checking critical components such as the battery, propellers, and flight controls to ensure they're in good condition.
- Calibrate the GPS and compass to guarantee accurate navigation and positioning for the flight.
- Inspect and adjust the camera and gimbal for proper alignment, ensuring clear footage during flight.
- Operate the remote controller, testing the responsiveness of control sticks, buttons, and switches to ensure proper functionality.
- Insert and manage storage devices like memory cards, ensuring enough space for data recording.
- Update the drone firmware and companion software to maintain functionality and access new features.
- Analyse weather conditions, such as wind speed and temperature, to determine if flight is safe and feasible.

## Demonstrate

- Demonstrate powering on and off the drone and remote controller.
- Show the procedure for checking the drone's battery, propellers, and flight controls.
- Demonstrate how to calibrate the GPS and compass of a drone.
- Show the proper adjustment of the drone's camera and gimbal.
- Demonstrate how to test the responsiveness of the remote controller's buttons and sticks.
- Demonstrate inserting a memory card and managing storage within the drone.
- Show how to update the drone firmware and companion software.
- Demonstrate assessing weather conditions and making a decision based on the analysis.



## Activity

1. **Activity Name:** Pre-Flight Inspection
2. **Objective:** To practice performing pre-flight inspections on drones, ensuring all essential components are ready for flight.
3. **Type of Activity:** Group
4. **Resources:** Drones, remote controllers, batteries, propellers, storage devices, weather charts, calibration tools
5. **Time Duration:** 30 minutes
6. **Instructions:**
  - Divide the participants into small groups.
  - Assign each group a drone and a set of tasks based on pre-flight checks (e.g., checking battery, propellers, camera).
  - Each group will work together to perform the tasks and report on the condition of each component.
  - After performing the checks, groups should analyse the weather conditions using available tools and determine if flying is feasible.
  - After the activity, groups will share their findings with the class, discussing any issues they encountered and solutions.
7. **Outcome:**
  - Participants will gain hands-on experience in performing comprehensive pre-flight checks on a drone.
  - They will also understand how to assess weather conditions and make informed decisions before flying.

## Notes for Facilitation

- Encourage participants to ask questions if they are unsure about any step of the process.
- Be patient and provide individual assistance if needed during the hands-on demonstrations.
- Remind participants that proper pre-flight checks can help prevent accidents and ensure a successful flight.
- Ensure that each participant has an opportunity to perform the checks and calibrations on the drone.
- Stress the importance of keeping equipment well-maintained to prolong the life of the drone and prevent malfunction during flight.
- Keep the pace of the session steady and allow time for participants to practice each step before moving to the next one.

## Unit 2.2: Drone Operation and Footage Capture

### Unit Objectives

By the end of this unit, the participants will be able to:

1. Show how to fly a drone in a controlled manner, maintaining stability, altitude, and situational awareness.
2. Use the camera controls on a drone's remote controller or mobile app to capture photos and record video.
3. Assess lighting conditions at a location to optimise camera settings and capture high-quality imagery.
4. Adjust camera settings, such as resolution, frame rate, ISO, and white balance, to achieve desired outcomes.
5. Discuss ways to frame shots using the live feed from the drone's camera and adjust drone position and orientation for composition.
6. Explain the basics of drone photography and various cinematic techniques for captivating aeral footages.
7. Demonstrate the process to safely land a drone in a suitable landing zone, considering the people and obstacles in the vicinity.

### Resources to be Used

Drones, drone remote controllers, mobile devices with drone apps, camera equipment, tripods, various lighting tools, video footage examples, whiteboard, markers, printed guidelines for drone operation and camera settings.

### Say

- Good morning everyone! I'm excited to dive into today's session on drone operation and footage capture.
- In today's session, we will learn how to operate drones efficiently and capture high-quality aerial footage.
- Understanding drone operation and how to capture stunning images and videos is important because it helps you use technology creatively, whether for personal, professional, or creative purposes.

### Ask

- How many of you have used a drone before or seen one in action?
- Can you think of a situation where drone footage might be helpful, like in movies or during events?
- What do you think makes a great photograph or video taken with a drone?

## Do

- Start by introducing the drone model and the remote controller or mobile app interface.
- Walk through the basic flight operation of a drone: stabilizing it, adjusting altitude, and keeping it within sight.
- Explain the different camera settings and their significance, then guide the group to explore these features on the mobile app or controller.
- Teach how to assess lighting at a location and adjust camera settings accordingly.
- Discuss techniques for framing shots and positioning the drone for optimal composition.
- Offer step-by-step instructions on safe landing protocols.
- Make sure to address the safety precautions while operating the drone, such as avoiding obstacles and managing power levels.

## Elaborate

- Demonstrate how to fly a drone in a controlled manner, ensuring stability, altitude, and situational awareness.
- Show how to use the camera controls on the drone's remote controller or mobile app for capturing photos and videos.
- Explain how to assess lighting conditions at a location and adjust camera settings accordingly to optimise imagery quality.
- Teach how to adjust camera settings such as resolution, frame rate, ISO, and white balance to achieve desired results.
- Discuss how to frame shots using the live feed from the drone's camera and adjust the drone's position and orientation for composition.
- Introduce the basics of drone photography and cinematic techniques for capturing engaging aerial footage.
- Demonstrate the safe landing process, considering people and obstacles in the vicinity.

## Demonstrate

Show how to fly the drone, adjust camera settings, and capture a short video or photo, then land it safely in a clear area.

## Activity

1. **Activity Name:** Drone Operation and Footage Capture
2. **Objective:** To practice drone operation and capture high-quality footage with proper settings.
3. **Type of Activity:** Individual
4. **Resources:** Drones, remote controllers, mobile apps, camera equipment
5. **Time Duration:** 30 minutes

**6. Instructions:**

- Each participant will receive a drone to operate.
- Follow the basic steps of drone operation, including takeoff, altitude control, and stabilization.
- Capture a short video or series of photos using the camera settings learned in the session.
- Assess the lighting conditions in the area and adjust the camera settings for optimal results.
- Once the footage is captured, practice safe landing procedures.

**7. Outcome:** Participants will demonstrate the ability to operate drones, adjust camera settings, and capture high-quality footage with an understanding of composition and lighting.

## Notes for Facilitation

- Ensure that each participant understands the basic operation of the drone before flying.
- Emphasize safety at all times, especially when operating drones in public areas or near other people.
- Be clear about the importance of checking the battery level and location for possible obstacles.
- Remind participants about the significance of proper framing and adjusting the camera settings to suit different lighting conditions.
- When demonstrating, ensure the drone is in a controlled environment to avoid accidents or crashes.
- Offer feedback and tips to participants as they practice, especially on optimizing their camera settings for the best shots.

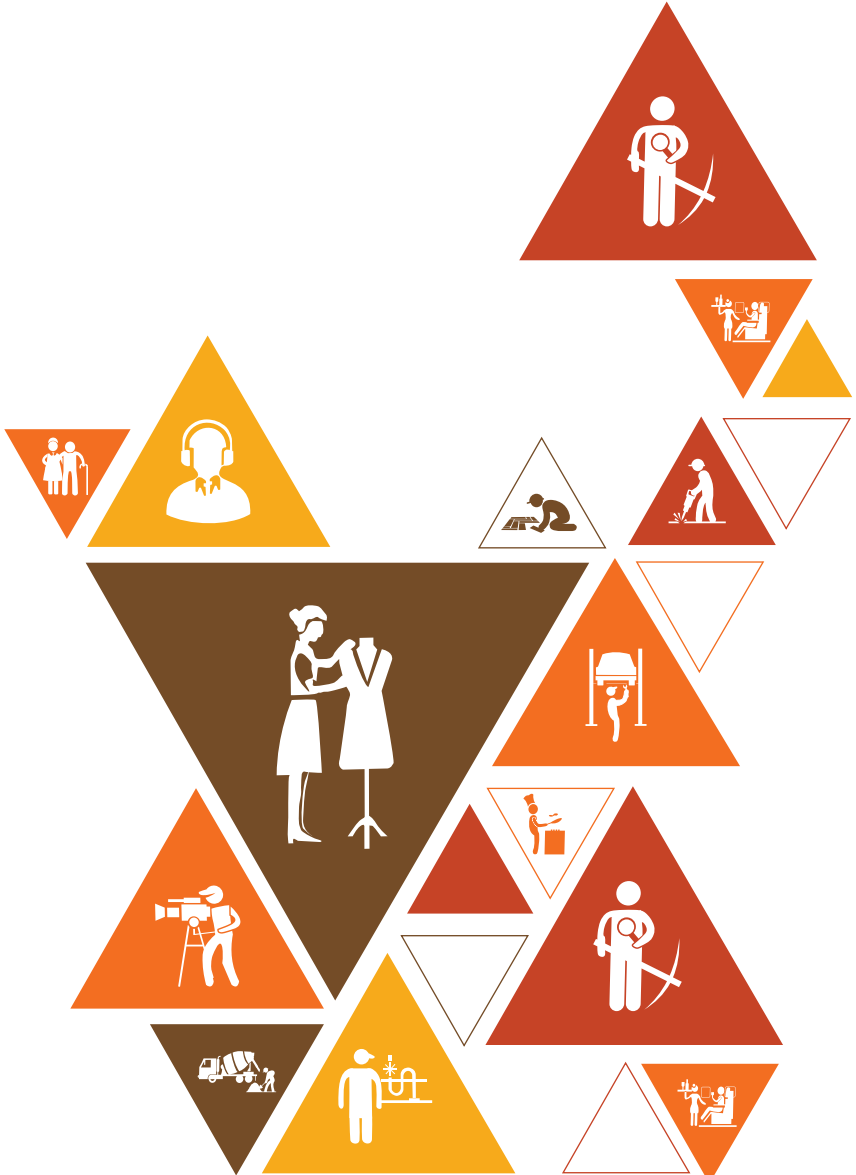
## Answers to Exercises for PHB

### Multiple Choice Questions:

1. c. In an open field
2. a. Brushless motors
3. c. ISO
4. c. Decrease the amount of light entering the lens
5. b. Trucking shot

### Descriptive Questions:

1. Refer Unit 2.1.4 Inspecting and Adjusting the Camera and Gimbal of a Drone
2. Refer Unit 2.1.6 Storing Data and Inserting a Memory Card in a Drone
3. Refer Unit 2.2.5 Assessing Lighting Conditions and Optimizing Camera Settings for Drone Footage
4. Refer Unit 2.2.6 Adjusting Camera Settings on a Drone
5. Refer Unit 2.2.8 Basics of Drone Photography



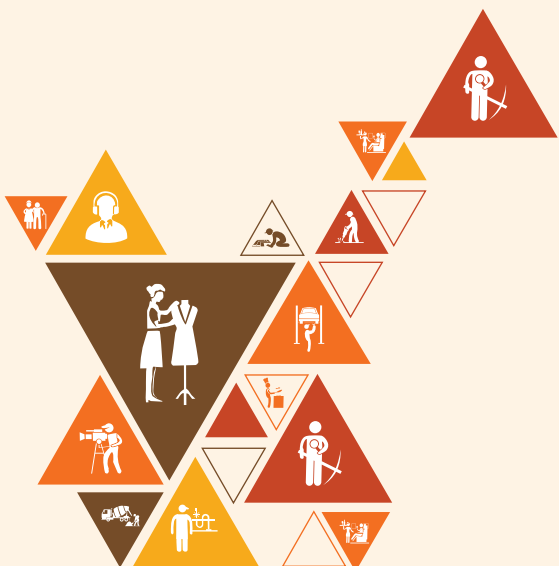


# 3. Perform Post Processing and Editing of Photographs and Footage

Unit 3.1 - Optimizing Computer and Software for Editing Tasks

Unit 3.2 - Editing Techniques and Software Utilization

Unit 3.3 - File Management and Data Backup



TEL/N6264

## Key Learning Outcomes



By the end of this module, the participants will be able to:

1. Describe the process of optimizing and maintaining editing workstations for drone media processing.
2. Demonstrate the process of using image and video editing software that is captured from drones.
3. Describe the importance of Storage and Backup Solutions.



## Unit 3.1: Optimizing Computer and Software for Editing Tasks

### Unit Objectives

By the end of this unit, the participants will be able to:

1. Identify the minimum hardware requirements necessary for running resource-intensive editing software.
2. Define the essential computer settings that can be configured and fine-tuned to optimize performance for editing tasks.
3. Explain the process of upgrading computer hardware to meet the specifications required for efficient editing.
4. Describe the importance of regularly updating the operating system, drivers, and editing software to ensure compatibility and performance.
5. Utilize hardware acceleration settings within editing software, such as GPU offloading, to enhance processing capabilities.

### Resources to be Used

Computer with editing software installed, projector, handouts on hardware requirements and settings, internet connection, demonstration video or live system for showing hardware upgrades, sample editing tasks (video or graphics), and a system with GPU capabilities.

### Say

- Hello everyone! I'm excited to have you here today. We're going to dive into optimizing computers and software for editing tasks, which is key to making your workflow much smoother and more efficient.
- By the end of this session, you'll understand how to ensure that your computer and software are perfectly set up to handle resource-intensive editing tasks.
- Understanding how to optimize your system for editing tasks can save you a lot of time and frustration when working with large files or complex software.

### Ask

- Have you ever experienced your editing software lagging or crashing when you're working on a big project?
- How often do you check or update your computer's hardware and software settings to ensure smooth performance?
- Do you know what the difference between hardware acceleration and normal processing is when working with editing software?

## Do

- Begin the session by introducing the key topics and ensuring the participants understand the importance of optimizing their systems for editing.
- Present a brief overview of the hardware requirements necessary for editing software, highlighting what happens when these requirements are not met.
- Walk through basic computer settings that can be configured and fine-tuned for better performance, explaining why each setting matters for editing tasks.
- Discuss the process of upgrading hardware components, focusing on which parts of the system can be upgraded for editing software efficiency.
- Cover the importance of updating operating systems, drivers, and editing software regularly, and explain how these updates affect overall performance and compatibility.
- Introduce hardware acceleration settings and demonstrate how using GPU offloading can improve performance in editing software.
- Encourage participants to ask questions as you move through each topic and offer real-world examples of how optimizing their systems can improve editing efficiency.

## Elaborate

- Understanding the essential components like RAM, CPU, and storage needed to run editing software effectively.
- Configuring settings such as processor priority, virtual memory, and background processes to maximize available resources for editing.
- Learning which hardware upgrades (such as adding more RAM, upgrading the GPU, or installing faster storage) will improve editing performance.
- Ensuring compatibility with the latest features, security patches, and performance improvements by keeping all software up to date.
- Activating hardware acceleration features like GPU offloading to shift demanding tasks from the CPU to the GPU, improving overall performance.

## Demonstrate

- Show how to check the system requirements for an editing software program and compare them to the actual specs of the computer.
- Demonstrate how to configure basic computer settings, such as allocating more virtual memory or adjusting background process priorities.
- Perform an example of upgrading a system's RAM or GPU to meet the demands of an editing task.
- Walk through the process of updating the operating system and drivers, explaining where to find updates and how to install them.
- Demonstrate enabling GPU offloading or hardware acceleration within the software settings.

## Activity

1. **Activity Name:** System Optimization Setup
2. **Objective:** Understand and apply the key concepts of optimizing a computer for editing tasks.
3. **Type of activity:** Group
4. **Resources:** Computers with editing software, internet access, projector for demonstration, system specifications charts.
5. **Time Duration:** 25 minutes
6. **Instructions:**
  - Divide the participants into small groups.
  - Provide each group with a set of system specifications charts and a checklist for optimizing computer settings.
  - Ask the groups to evaluate their current system setup (if applicable) or use sample data and identify areas where optimization can occur.
  - Guide the groups in researching the necessary hardware requirements and settings for running resource-intensive editing software.
  - Have each group come up with an improvement plan for their systems based on the session's content, including hardware upgrades and software settings adjustments.
7. **Outcome:** Participants will develop a clear understanding of how to assess and optimize a system's hardware and software for efficient editing tasks.

## Notes for Facilitation

- Encourage participants to interact and ask questions throughout the session to ensure they are grasping the concepts.
- Provide clear examples and demonstrations to help participants relate theoretical knowledge to practical scenarios.
- When discussing hardware upgrades, emphasize the importance of cost-effectiveness and compatibility.
- Highlight the value of keeping both the operating system and drivers up to date to avoid performance issues.
- Make sure participants understand the difference between CPU-based processing and hardware acceleration via the GPU for editing tasks.
- Remind participants that the optimization process will vary depending on the specific software they use, but the principles remain the same.

## Unit 3.2: Editing Techniques and Software Utilization

### Unit Objectives

By the end of this unit, the participants will be able to:

1. Compare and contrast different image and video editing software options based on their features and suitability for specific editing goals.
2. Install and set up different image and video editing software on a computer.
3. Utilize various editing features, such as colour correction, filters and effects, cropping and resizing tools, stabilization, etc., to achieve desired editing goals.
4. Demonstrate the process of implementing proxy or optimized media files to enhance editing efficiency while preserving original media quality.
5. Show how to render high-resolution files for optimal output quality.

### Resources to be Used

Image and video editing software (such as Adobe Photoshop, Adobe Premiere Pro, DaVinci Resolve, Final Cut Pro, etc.), computers with required specifications, internet connection for software installation, media files (images and videos), project files for practice, screen recording software, presentation slides, projector for demonstrations.

### Say

- Good day everyone, I'm excited to guide you through the fascinating world of image and video editing techniques today!
- In this session, we will explore how to work with different editing software and tools, so you can easily enhance your media projects.
- Understanding these editing techniques is essential because it allows you to transform raw footage or images into professional-quality content, enhancing your creative work.

### Ask

- How many of you have edited photos or videos before? What software have you used?
- When was the last time you watched a video and noticed the effects, filters, or color grading used?
- Have you ever had trouble editing or adjusting an image or video to get it just right? What were the challenges?

## Do

- Start by introducing the session objectives and providing a brief overview of the different image and video editing software available.
- Walk the trainees through the installation process for one of the most commonly used software (Adobe Photoshop or Premiere Pro) and assist where necessary.
- Demonstrate the basic features of editing software, focusing on color correction, filters, cropping, resizing, and stabilization tools.
- Explain the importance of proxy or optimized media files and how they can help improve efficiency without compromising media quality.
- Show the trainees how to render high-resolution files for the best output quality.

## Elaborate

- Assess the strengths and weaknesses of different software options for specific editing needs.
- Guide through the installation and system setup process for smooth functionality.
- Demonstrate how to apply tools like colour correction, filters, and cropping to achieve desired results.
- Explain how using these media types helps to improve editing speed and efficiency while maintaining quality.
- Teach the process of exporting or rendering high-quality media files for professional output.

## Demonstrate

Show the trainees how to perform a basic color correction and apply a filter to an image in Photoshop and a video in Premiere Pro.

## Activity

1. **Activity Name:** Image and Video Editing Tools Exploration
2. **Objective:** To practice using different editing features in image and video software
3. **Type of activity:** Individual
4. **Resources:** Computers with image and video editing software, media files for editing
5. **Time Duration:** 30 minutes
6. **Instructions:**
  - Open an image in Adobe Photoshop or another chosen software.
  - Perform basic edits, such as cropping, resizing, and applying a filter.
  - Open a video file in Adobe Premiere Pro or another editing software.
  - Use stabilization, color correction, and filters to enhance the video.
  - Export both the image and video in high resolution.
7. **Outcome:** Participants will be able to edit an image and a video using different features and export them in optimal quality.

## Notes for Facilitation



- Be patient with the installation process, as some software may take time to set up depending on the computer specifications.
- Encourage participants to ask questions if they encounter difficulties using the software.
- Highlight the importance of proxy files for smoother editing, especially when working with large video files.
- Remind trainees that high-resolution rendering may take time, depending on the media file size and system specifications.
- Foster creativity when applying editing tools to media, encouraging experimentation with effects and filters.
- Emphasize the real-world relevance of these skills in various media and creative industries.

## Unit 3.3: File Management and Data Backup

### Unit Objectives

By the end of this unit, the participants will be able to:

1. Illustrate ways to organize files into a logical folder structure for efficient file management.
2. Evaluate the storage space required for storing drone photographs and footage.
3. Utilize external hard drives or SSDs with sufficient capacity to accommodate drone files.
4. Show how to transfer drone files from memory cards or internal storage to the computer's primary storage device or external hard drives.
5. Implement backup solutions, such as cloud storage services or RAID systems, to protect drone files from loss or damage.
6. Demonstrate the process of setting up and scheduling regular backups to ensure consistent data backup for drone files.

### Resources to be Used

Laptop, drone files or sample images, memory cards, external hard drives/SSDs, cloud storage account (e.g., Google Drive, Dropbox), RAID setup software, video demonstration clips, projector, whiteboard, markers, internet connection, and sample file management software (e.g., Windows File Explorer, macOS Finder).

### Say

- Hello everyone! I'm excited to get started with today's session.
- Today, we'll be learning how to manage drone files efficiently and ensure their safety through backups.
- It's essential to know how to organize and protect your files to avoid data loss and keep everything running smoothly.

### Ask

- How often do you organize files on your computer or external drives?
- Have you ever lost important files due to a system crash or accidental deletion?
- What do you currently use to back up your important data, if anything?

### Do

- Start the session with an enthusiastic greeting and briefly outline the objective.
- Present an overview of the key topics and explain why effective file management and backups are crucial.
- Introduce the concept of logical folder structures for organizing files and demonstrate with examples.

- Show how to evaluate storage needs for drone footage and photographs, explaining factors like resolution and file size.
- Demonstrate how to use external storage options (hard drives/SSDs) and show how they work to store large drone files.
- Guide participants through the process of transferring files from memory cards or internal storage to external drives.
- Explain various backup options (cloud storage, RAID systems) and demonstrate setting up a backup schedule for regular updates.

## Elaborate



- Organize files by creating a logical folder structure to make it easier to locate files and maintain order.
- Evaluate storage space by analyzing the file sizes of drone photographs and footage to ensure enough capacity for storage.
- Utilize external drives or SSDs that offer ample storage capacity for managing large drone files.
- Transfer drone files from memory cards or internal storage to a primary storage device, like your computer or external hard drive.
- Implement backup solutions such as cloud storage or RAID to prevent the loss of important drone data.
- Set up and schedule regular backups to automatically back up files on a consistent basis.

## Demonstrate



Show how to transfer drone footage from a memory card to an external hard drive and organize the files into a logical folder structure.

## Activity



1. **Activity Name:** Organizing and Backing Up Drone Files
2. **Objective:** To practice organizing drone files into a folder structure and set up a backup solution.
3. **Type of activity:** Individual
4. **Resources:** Laptop, external hard drive, sample drone files, cloud storage account.
5. **Time Duration:** 30 minutes
6. **Instructions:**
  - Ask participants to organize a folder structure on their laptop or external hard drive based on the sample drone files provided.
  - Demonstrate how to transfer the files into appropriately named folders (e.g., Date, Location, Event).
  - Walk them through the steps to set up a cloud storage service and initiate the first backup of their files.
  - Ensure they set up a schedule for automated backups if they have cloud storage available.
7. **Outcome:** Participants will be able to organize their drone files effectively and implement a basic backup strategy to protect their data.



## Notes for Facilitation

- Encourage participants to ask questions during the session, especially when setting up backup systems or transferring files.
- Be patient when participants are setting up their backup solutions as they may need time to familiarize themselves with the software.
- Ensure that participants understand the importance of regular backups and file organization, particularly when handling large files such as drone footage.
- Stress the importance of both cloud and external storage as complementary solutions for safeguarding drone files.
- Remind participants to regularly evaluate storage needs as drone file sizes increase.

## Answers to Exercises for PHB

### Multiple Choice Questions:

1. b. It offloads tasks to the GPU for faster processing
2. a. Final Cut Pro
3. c. Faster read/write speeds for editing
4. b. Automatically syncing files to cloud storage
5. b. Verify the transfer by opening the files

### Descriptive Questions:

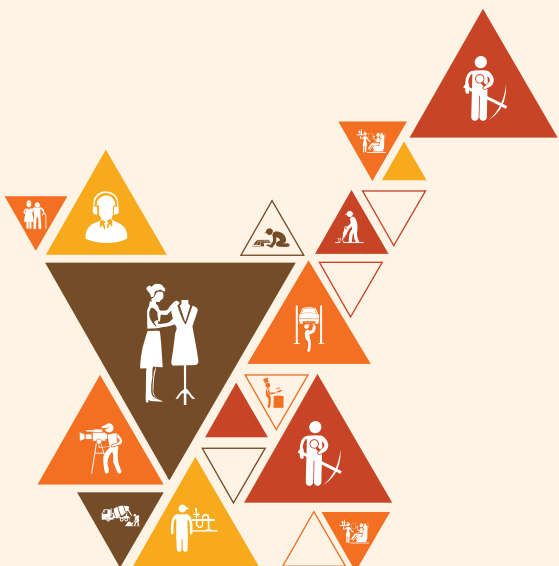
1. Refer Unit 3.1.5 Hardware Acceleration Settings
2. Refer Unit 3.1.5 Hardware Acceleration Settings
3. Refer Unit 3.1.2 Optimizing Computer Settings for Seamless Editing Performance
4. Refer Unit 3.3.3 Using External Storage
5. Refer Unit 3.3.4 Transferring Drone Files to Internal/External Storage



# 4. Preventive Maintenance and Troubleshooting of Drones and Related Accessories

Unit 4.1 - Identifying and Diagnosing Drone Issues

Unit 4.2 - Preventive Maintenance and Repair of Drones



TEL/N6265

## Key Learning Outcomes



By the end of this module, the participants will be able to:

1. Describe the drone related issues.
2. Demonstrate the steps to repair and maintain a drones
3. Illustrate the process of repairing and maintaining different drone accessories.

## Unit 4.1: Identifying and Diagnosing Drone Issues

### Unit Objectives

By the end of this unit, the participants will be able to:

1. Conduct visual inspections of drone accessories, such as propellers, chargers, remote controllers, camera gimbals, and ND filters, for signs of damage, wear, or malfunction.
2. Define the potential signs of abnormal behaviour, error messages, and visual cues exhibited by a drone or its accessories that may indicate issues or malfunctions.
3. Explain the functional interdependencies between different drone components, such as frames, motors, propellers, batteries, cameras, gimbals, and additional accessories.
4. Show how to inspect batteries regularly for signs of damage or swelling and know when to replace them when necessary.
5. Analyze flight logs to extract and interpret performance data from drones.
6. Describe a systematic approach for troubleshooting and isolating the root cause of problems in drones and their accessories.

### Resources to be Used

Drones, propellers, chargers, remote controllers, camera gimbals, ND filters, damaged drone accessories, flight logs, battery testing tools, troubleshooting manuals, computer or mobile device for log analysis.

### Say

- Welcome everyone! I'm excited to dive into today's session on diagnosing and identifying drone issues.
- By the end of today's class, you'll be able to inspect and identify issues with drones and their accessories.
- Understanding how to diagnose and fix issues ensures safer flights and better drone performance, which will save time and reduce repair costs.

### Ask

- Have you ever noticed an unusual sound coming from a drone during flight?
- Can you recall any issues with the remote controller or accessories that affected the drone's performance?
- Have you ever had to troubleshoot a malfunctioning drone, and if so, how did you approach it?

### Do

- Start the session with a brief introduction to drone issues and why it's essential to identify them early.
- Go over the specific accessories (propellers, chargers, remote controllers, etc.) and demonstrate how to spot wear or malfunction.

- Engage the participants with a discussion on abnormal drone behaviour, error messages, and visual cues to understand the symptoms of issues.
- Walk the participants through the functional interdependencies between different drone components.
- Explain how to inspect batteries and the warning signs of damage.
- Guide the participants on how to analyze flight logs for performance data.
- Introduce a systematic troubleshooting approach for diagnosing problems.
- Wrap up the session with a Q&A to address any uncertainties.

## Elaborate



- Learn how to examine the drone's parts like propellers and controllers for damage, wear, or malfunction.
- Identify error messages, sounds, and other visual cues indicating drone issues.
- Explore how different parts of the drone, like motors and cameras, interact and affect overall performance.
- Understand the signs of battery damage or swelling and how to safely replace them when necessary.
- Extract and interpret data from flight logs to assess drone performance and spot potential issues.
- Learn a step-by-step method for isolating and resolving drone problems effectively.

## Demonstrate



- Show how to visually inspect a drone, pointing out common signs of damage or wear in accessories like propellers and controllers.
- Demonstrate how to analyze a flight log to spot performance issues.
- Perform a battery inspection, highlighting signs of swelling or damage.

## Activity



1. **Activity:** Hands-on Inspection of Drone Accessories
2. **Objective:** To teach participants how to conduct a visual inspection of drone accessories, identify potential issues, and apply troubleshooting techniques.
3. **Type of activity:** Group
4. **Resources:** Drones, propellers, chargers, remote controllers, camera gimbals, ND filters, flight logs, battery testing tools
5. **Time Duration:** 30 minutes
6. **Instructions:**
  - Divide participants into small groups.
  - Provide each group with a drone and its accessories.
  - Ask the groups to conduct a visual inspection of the drone and its accessories for damage or malfunction, focusing on the propellers, charger, remote controller, camera gimbal, ND filters, and battery.

- Have each group identify at least one issue (real or hypothetical) and report back to the facilitator.
  - After the inspection, ask each group to interpret data from a flight log and pinpoint potential issues.
  - Discuss findings as a class and share troubleshooting strategies.
7. **Outcome:** Participants will gain hands-on experience in inspecting and diagnosing issues with drones and their accessories, reinforcing the importance of regular checks and maintenance.

## Notes for Facilitation

- Create an engaging learning environment by encouraging participants to share their experiences with drones and troubleshooting.
- Ensure that participants have the opportunity to practice hands-on inspection techniques.
- Focus on highlighting the importance of inspecting accessories and logs regularly to prevent potential problems.
- Offer clear explanations when demonstrating how to read flight logs.
- Be patient and provide guidance to any participants struggling with the inspection process or flight log analysis.

## Unit 4.2: Preventive Maintenance and Repair of Drones

### Unit Objectives

By the end of this unit, the participants will be able to:

1. Explain the importance of regular preventive maintenance tasks recommended by manufacturers, including cleaning, inspection, firmware updates, and battery health checks.
2. Display proper cleaning techniques for drones and their accessories, including using a soft brush or compressed air to remove debris.
3. Discuss the importance of calibrating utilities, sensor status indicators, or drone connectivity testers for optimal performance.
4. Identify and replace faulty parts of drones and their accessories after inspection and diagnosis.

### Resources to be Used

Drones, drone accessories (battery, propellers, sensors), soft brush, compressed air, cleaning cloth, maintenance logs, calibration tools, laptop with firmware update software, tools for inspection, replacement parts for drones (motors, sensors, etc.), instructional videos, whiteboard, projector.

### Say

- “Good morning, everyone! I’m excited to dive into today’s session on preventive maintenance and repair of drones.”
- “By the end of this session, you’ll understand the importance of preventive maintenance and how to perform essential tasks like cleaning, calibration, and repairs.”
- “Maintaining your drone properly can significantly extend its lifespan and ensure its optimal performance, so it’s crucial to grasp these techniques.”

### Ask

- “How often do you think you should clean your drone to keep it in good condition?”
- “Have any of you experienced connectivity or sensor issues with your drones?”
- “What do you think could happen if you neglect regular maintenance on your drone?”

### Do

- Start with a brief introduction of the session and explain the importance of preventive maintenance.
- Use the projector to show examples of drones with common issues caused by poor maintenance.
- Walk the participants through the basic tools needed for maintenance.
- Demonstrate cleaning techniques using a soft brush and compressed air on a drone.



- Explain the role of firmware updates and calibrations and show how to perform these tasks on a laptop.
- Guide participants in identifying and replacing faulty parts in drones, explaining the diagnostic process.
- Ask participants to perform basic maintenance tasks on the drone as you supervise and assist.

## Elaborate

- Explain the importance of regular cleaning to avoid dirt accumulation and damage to components.
- Discuss how regular inspection of the drone's parts ensures early detection of wear and tear.
- Explain the role of firmware updates in improving the drone's performance and fixing bugs.
- Discuss the significance of battery health checks and tips for prolonging battery life.
- Describe the steps to calibrate sensors and utilities to maintain optimal drone performance.
- Identify how faulty parts can be diagnosed and replaced, including motors and sensors.

## Demonstrate

Demonstrate how to use compressed air to remove dust from the propellers and vents of a drone.

## Activity

1. **Activity Name:** Drone Maintenance Task
2. **Objective:** To practice proper cleaning, inspection, and repair techniques.
3. **Type of activity:** Group
4. **Resources:** Drones, cleaning tools (soft brush, compressed air), inspection tools, replacement parts, maintenance logs
5. **Time Duration:** 30 minutes
6. **Instructions:**
  - Divide the class into small groups.
  - Assign each group a drone to inspect for common maintenance issues (e.g., dirt accumulation, battery health, sensor calibration).
  - Ask each group to clean their drone using appropriate tools (brush, air) and check the battery and sensors.
  - Have each group perform a basic firmware update and calibration, documenting the steps in a maintenance log.
  - Groups should identify and replace any faulty parts found during their inspection.
  - After completing the tasks, each group will present their findings and discuss the steps they took for maintenance.
7. **Outcome:** Participants will gain hands-on experience in performing essential drone maintenance tasks and will be able to apply these techniques to ensure their drones remain in optimal condition.

## Notes for Facilitation



- Make sure to keep the session interactive by encouraging participants to ask questions as they perform tasks.
- Provide continuous guidance during the hands-on demonstration, especially when handling delicate drone parts.
- Highlight the importance of safety when handling drones and tools.
- Emphasize that regular preventive maintenance can save time and money by preventing costly repairs in the long run.
- Remind participants to always consult the manufacturer's guidelines for specific maintenance procedures for different drone models.
- Encourage participants to make a habit of documenting maintenance activities in a log for future reference.

## Answers to Exercises for PHB

### Multiple Choice Question

1. c. Insufficient satellite connectivity
2. b. Disconnect the battery
3. b. Replace it immediately
4. b. Microfiber cloth
5. c. IMU (Inertial Measurement Unit)

### Descriptive Questions:

1. Refer Unit 4.1.1 Visual Inspections of Drone Accessories for Damage and Malfunctions
2. Refer Unit 4.1.1 Visual Inspections of Drone Accessories for Damage and Malfunctions
3. Refer Unit 4.1.6 Analyzing Flight Logs to Determine Drone Performance
4. Refer Unit 4.2.3 Importance of Calibrating Drones Utilities and Sensors
5. Refer Unit 4.2.1 Preventive Maintenance of Drones





## Key Learning Outcomes



By the end of this module, the participants will be able to:

1. Describe the use of drones in real estate.
2. Discuss the application of drones in agriculture.
3. Recognize the use of drones in the media and journalism industry.
4. Illustrate the application of drones in the tourism and hospitality industry.

## Unit 5.1: Applications of Drone Photography in Real Estate, Agriculture and Media

### Unit Objectives

By the end of this unit, the participants will be able to:

1. Define the key considerations for capturing high-quality aerial photographs of real estate properties, including property features, surrounding landscapes, and amenities.
2. Describe the techniques for capturing wide-angle shots or panoramic views of real estate properties to provide comprehensive overviews.
3. Discuss the techniques for capturing smooth and cinematic footage, incorporating transitions, and adding music or voiceovers to create engaging real estate videos.
4. Describe the process of operating a drone equipped with a camera for capturing high-resolution aerial photographs of agricultural fields and crops.
5. Analyze aerial imagery to assess crop health, identify stress or diseases, monitor nutrient deficiencies, and evaluate overall crop conditions.
6. Integrate remote sensing technologies, such as multispectral or thermal cameras, into drone platforms for agricultural applications.
7. Discuss the use of drone photography in creating engaging promotional content, including videos and images, for marketing campaigns and various media channels.
8. Explain the use of drone photography in showcasing tourist destinations, hotels, and resorts, including amenities and appealing features.

### Resources to be Used

Drones, cameras with high resolution, software for image editing, remote sensing devices like multispectral and thermal cameras, agricultural field samples, real estate property samples, promotional content examples, video editing software, laptops, projector, and internet connection.

### Say

- Hello everyone, welcome to today's session! I'm excited to dive into the world of drone photography and how it's transforming industries like real estate, agriculture, and media.
- In this session, we'll be exploring key techniques for capturing aerial photographs and videos for real estate, monitoring agricultural crops, and creating engaging promotional media.
- Understanding these techniques will not only enhance your skills in photography and videography but also give you a competitive edge in industries that are increasingly relying on drone technology.

## Ask

- How many of you have seen drone footage used in property listings or promotional videos?
- Do you think drones could help improve the way we assess agricultural fields?
- Have you ever thought about how drones are used in creating content for tourism or media?

## Do

- Begin by introducing the session objectives and engaging the participants with questions to spark their interest.
- Provide an overview of how drone photography is revolutionizing real estate, agriculture, and media industries.
- Demonstrate different drone features and functionalities that help capture high-resolution images and videos.
- Show real examples of aerial photos and videos for real estate properties and agricultural fields.
- Explain and demonstrate the different types of aerial shots (wide-angle, panoramic, and cinematic footage).
- Introduce basic video editing techniques that can be used to enhance real estate footage.
- Discuss how drone imagery can be integrated into marketing and media campaigns.

## Elaborate

- Define the key considerations for capturing high-quality aerial photographs of real estate properties, such as property features, surrounding landscapes, and amenities.
- Describe techniques for capturing wide-angle shots or panoramic views of real estate properties to provide comprehensive overviews.
- Discuss how to capture smooth and cinematic footage, incorporating transitions, and adding music or voiceovers to create engaging real estate videos.
- Describe how to operate a drone equipped with a camera for capturing high-resolution aerial photographs of agricultural fields and crops.
- Analyze aerial imagery to assess crop health, identify stress or diseases, monitor nutrient deficiencies, and evaluate overall crop conditions.
- Integrate remote sensing technologies, such as multispectral or thermal cameras, into drone platforms for agricultural applications.
- Discuss the use of drone photography in creating engaging promotional content, including videos and images, for marketing campaigns and various media channels.
- Explain how drone photography can showcase tourist destinations, hotels, and resorts, including amenities and appealing features.

## Demonstrate

Show how a drone captures an aerial shot of a real estate property, highlighting key features like the building, surrounding landscape, and amenities.



## Activity

1. **Activity Name:** Drone Photography for Real Estate and Agriculture
2. **Objective:** To practice capturing aerial shots and understanding their impact on real estate and agricultural imagery.
3. **Type of Activity:** Group
4. **Resources:** Drones, cameras, laptops with video editing software, real estate property examples, agricultural field samples
5. **Time Duration:** 30 minutes
6. **Instructions:**
  - Divide participants into two groups: one focusing on real estate and the other on agriculture.
  - The real estate group will capture images or videos of a property, focusing on wide-angle or panoramic shots.
  - The agricultural group will capture aerial footage of a crop field, noting crop health and any potential stress or deficiencies.
  - After capturing the footage, the groups will come together to edit the content using video editing software, adding transitions and music if required.
  - Present the edited videos and images to the class, explaining the techniques used in capturing them.
7. **Outcome:** Participants will gain practical experience in capturing and editing aerial images and videos for both real estate and agricultural purposes.

## Notes for Facilitation

- Ensure that participants are familiar with the basic functions of the drone before starting the activity.
- Be mindful of weather conditions when demonstrating drone operations outdoors.
- While explaining techniques, emphasize how drone photography can enhance both real estate marketing and agricultural analysis.
- Encourage participants to experiment with different angles and compositions when shooting aerial footage.
- Discuss the importance of using high-resolution cameras to capture detailed images for both real estate and agriculture.

## Unit 5.2: Specialized Drone Applications

### Unit Objectives

By the end of this unit, the participants will be able to:

1. Describe the inspection process for power lines, transmission towers, and energy infrastructure using drone technology.
2. Evaluate the advanced imaging capabilities of drones in the context of search and rescue missions.
3. Apply knowledge of drone operation to proficiently navigate through challenging terrains, varying weather conditions, and complex environments.

### Resources to be Used

Drones, Powerline Inspection Software, Transmission Tower Blueprint, High-resolution cameras, GPS navigation systems, Safety gear, Headsets, Rescue drones with infrared cameras, Simulation software, Laptops, Projector, Whiteboard and markers, Tripods, and Power sources.

### Say

- Welcome everyone to today's class! I'm excited to dive into the fascinating world of specialized drone applications.
- Our objective today is to understand how drones can be used for inspecting power lines, enhancing search and rescue missions, and navigating through complex terrains and weather conditions.
- It's crucial to understand these topics because drones are transforming industries by making processes safer, more efficient, and more cost-effective.

### Ask

- Have you ever seen drones being used for infrastructure inspections? What was the purpose?
- If you were in a rescue operation, how do you think drones could help save lives in challenging environments?
- Do you think drones can navigate safely through unpredictable weather conditions, and how?

### Do

- Introduce the session by discussing the various ways drones are used across industries.
- Engage participants by asking them about their experiences or thoughts on drone technology in everyday life.
- Walk through the inspection process for power lines and transmission towers using drones, explaining how advanced imaging helps in these scenarios.

- Discuss the role of drones in search and rescue missions, highlighting the importance of thermal imaging and aerial views.
- Demonstrate the operation of drones in different environments, emphasizing the technical skills required for effective navigation in various terrains.

## Elaborate

- Describe the process of inspecting power lines using drones, detailing the steps involved and how drones make it safer and more efficient.
- Evaluate the use of drones for search and rescue, explaining how drones provide critical aerial perspectives and advanced imaging capabilities in emergency situations.
- Apply the knowledge of drone operations to explore how they can navigate through complex terrains and challenging weather conditions.
- Identify the advanced imaging technologies drones use, like infrared and high-resolution cameras, and how these enhance inspection and rescue efforts.

## Demonstrate

Show how drones equipped with thermal cameras can detect heat signatures during search and rescue operations, guiding rescuers to the exact location of victims.

## Activity

1. **Activity Name:** Drone Navigation Simulation
2. **Objective:** To apply knowledge of drone operation in varied terrains and weather conditions.
3. **Type of activity:** Individual
4. **Resources:** Drone simulation software, Laptops, Headsets, Projector
5. **Time Duration:** 30 minutes
6. **Instructions:**
  - Set up the simulation software for the participants.
  - Brief them on different terrains and weather scenarios in the simulation.
  - Allow each participant to navigate a drone through the simulation under various conditions such as fog, rain, and mountainous terrain.
  - Discuss the challenges faced and the techniques used to overcome them.
7. **Outcome:** Participants will learn how to adapt their drone navigation strategies to difficult environments and conditions.

## Notes for Facilitation

- Create an open environment where participants feel comfortable discussing their thoughts and experiences with drones.
- Ensure all participants are familiar with the basic operations of a drone before starting the detailed lessons on specialized applications.
- Emphasize the importance of safety during drone operations, particularly in power line inspections and rescue missions.
- Provide real-life examples of how drones have been used to assist in infrastructure inspections and rescues to make the learning experience relatable.
- Reinforce the critical role drones play in improving efficiency and safety in various sectors.

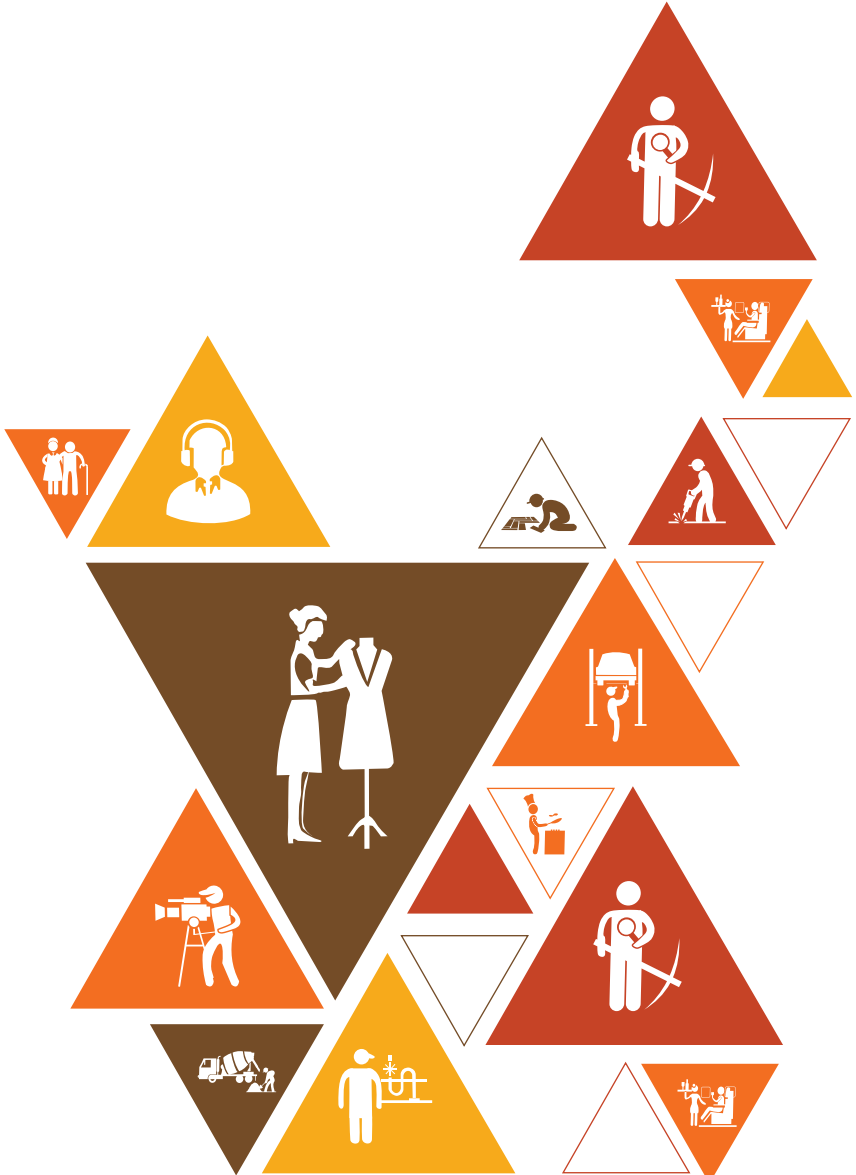
## Answers to Exercises for PHB

### Multiple Choice Question

1. b. Detecting crop stress and disease
2. b. Ability to capture aerial views of locations
3. c. It helps to evaluate plant health
4. b. To capture more of the property and surrounding landscape
5. b. To create 3D models of terrain and infrastructure

### Descriptive Questions:

1. Refer Unit 5.1.7 Using Drone Photography to Create Promotional Content for Marketing Campaigns
2. Refer Unit 5.2.1 Inspecting Power Lines, Transmission Towers, and Energy Infrastructure Using Drone
3. Refer Unit 5.1.5 Analyzing Aerial Imagery for Assessing Crop Health
4. Refer Unit 5.1.2 Advanced Imaging Capabilities of Drones in Search and Rescue Missions
5. Refer Unit 5.1.7 Using Drone Photography to Create Promotional Content for Marketing Campaigns





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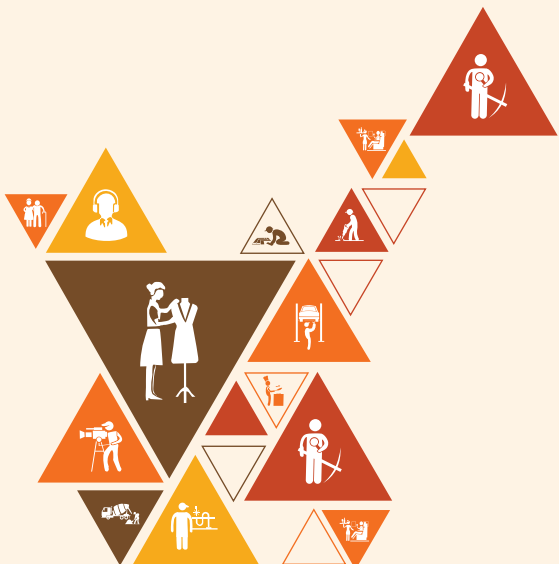


## 7. Annexures

Annexure I: Training Delivery Plan

Annexure II: Assessment Criteria

Annexure III: List of QR Codes Used in PHB



## Annexure I

### Training Delivery Plan

Training Delivery Plan			
<b>Program Name:</b>	Dron-O-Grapher		
<b>Qualification Pack Name &amp; Ref. ID</b>	Dron-O-Grapher, TEL/Q6221, V1.0		
<b>Version No.</b>	1.0	<b>Version Update Date</b>	Not Applicable
<b>Pre-requisites to Training (if any)</b>	Not Applicable		
<b>Training Outcomes</b>	<p><b>By the end of this program, the participants will be able to:</b></p> <ol style="list-style-type: none"> <li>1. Demonstrate drone operations and its camera accessories</li> <li>2. Perform post processing and editing of photographs and footages</li> <li>3. Illustrate the process of maintenance and troubleshooting of drones.</li> <li>4. Define the use of drones in different other sectors.</li> <li>5. Explain the importance of organising work and resources as per health and Safety standards.</li> <li>6. Explain the importance of interacting effectively with team members and customers.</li> </ol>		

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
1.	Introduction to the Role of a Dron-o-Grapher	Role of a Dron-o-Grapher	<ul style="list-style-type: none"> <li>Describe the size and scope of the Telecom industry and its subsectors.</li> <li>Illustrate the drone technology.</li> <li>Discuss the role and responsibilities of a Dron-o-Grapher.</li> </ul>	Bridge Module	Classroom lecture / Power-Point Presentation / Question & Answer / Group Discussion	Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films	8 Theory (06:00) Practical (02:00)
		DGCA Guidelines and Employment Opportunities for a Dron-o-Grapher	<ul style="list-style-type: none"> <li>Discuss the DGCA guidelines for drones.</li> <li>Identify various employment opportunities for a Dron-o-Grapher.</li> </ul>				8 Theory (06:00) Practical (02:00)
		Organisational Policies on Workplace Ethics	<ul style="list-style-type: none"> <li>Discuss the organisational policies on workplace ethics, managing sites, quality standards, personnel management and public relations (PR).</li> </ul>				8 Theory (06:00) Practical (02:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		<b>Operational Organizational Policies on Workplace Ethics</b>	<ul style="list-style-type: none"> <li>List the various daily, weekly, monthly operations/activities that take place at the site under a Dron-o-Grapher.</li> </ul>				6 Theory (02:00) Practical (04:00)
2.	<b>Operate drone and camera accessories</b>	<b>Pre-Operational Drone Checks</b>	<ul style="list-style-type: none"> <li>Recall the steps involved in ensuring the drone's battery is fully charged and securely connected.</li> <li>Identify potential damage or wear on the drone's battery and its connectors.</li> <li>Examine the propellers for cracks, chips, or damage and check for proper mounting and tightness.</li> <li>Verify that all flight controls are functioning properly and responding correctly.</li> <li>Explain the process of calibrating and checking the drone's GPS and compass.</li> <li>Recognize potential issues with the camera and gimbal and identify the steps for checking them for misalignment.</li> <li>Identify the importance of inserting a suitable memory card/storage device with adequate capacity into the camera.</li> <li>Demonstrate checking the remote controller for full charge and proper functionality.</li> <li>Describe the procedure for verifying the responsiveness of control sticks, buttons, and switches.</li> </ul>	TEL/N6263 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11	Classroom lecture / Power-Point Presentation / Question & Answer / Group Discussion	Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Drones, Batteries (to power the drones) Propellers (for inspection and examination), Control system testing tools (such as software or diagnostic devices), GPS calibration equipment, Compass calibration equipment, Camera and gimbal inspection tools, Memory cards or storage devices, Remote controllers, Firmware and software update tools, Weather condition monitoring tools (such as meteorological instruments or apps),	8 Theory (03:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			<ul style="list-style-type: none"> <li>Recognize the importance of ensuring that the drone's firmware and connected software are up-to-date.</li> <li>Interpret weather conditions and assess any advisories or restrictions that may affect drone operation.</li> </ul>			Power switches for drones and remote controllers, Suitable landing zones, Camera control features on remote controllers or mobile apps, Camera settings adjustment tools, Lighting assessment tools, Safety equipment (such as protective gear, first aid kits, fire extinguishers, etc.).	
		<b>Executing Flight Operations</b>	<ul style="list-style-type: none"> <li>Apply the correct procedure to power on the drone and remote controller for flight.</li> <li>Analyze the drone's sensors, GPS lock, and flight mode for pre-flight readiness.</li> <li>Execute the correct procedure to increase throttle slowly and lift the drone off the ground.</li> <li>Demonstrate maintaining a steady ascent while monitoring altitude and stability.</li> <li>Use effective techniques to follow the flight path while avoiding obstacles and restricted areas.</li> <li>Monitor the battery level and make appropriate decisions if it reaches a low level.</li> <li>Maintain visual contact with the drone at all times and demonstrate awareness of the surroundings.</li> <li>Utilize the camera controls to adjust settings and angles for capturing desired footage or images.</li> </ul>	TEL/N6263 PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC22, PC23, PC24			8 Theory (03:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			<ul style="list-style-type: none"> <li>Monitor telemetry data such as altitude, speed, and battery levels during flight.</li> <li>Choose a suitable landing zone that is clear of obstacles and people.</li> <li>Demonstrate safe descending and landing of the drone.</li> <li>Power off the drone and remote controller after a successful landing.</li> </ul>				
		<b>Capturing Aerial Footage and Photography</b>	<ul style="list-style-type: none"> <li>Adjust camera settings, including resolution, frame rate, ISO, and white balance, based on desired photographic or video outcomes.</li> <li>Analyze lighting conditions to ensure optimal image quality.</li> <li>Demonstrate flying the drone to the desired location for capturing photos or videos.</li> <li>Stabilize the drone before capturing any shots to ensure clear and steady footage.</li> <li>Frame shots using the live feed from the drone's camera.</li> <li>Adjust the drone's position and orientation to achieve the ideal shot composition.</li> <li>Use remote or mobile app controls to capture clear and well-composed images.</li> <li>Switch the drone's camera to video mode and begin recording.</li> <li>Execute smooth and controlled maneuvers to avoid shaky footage and ensure high-quality captures.</li> </ul>	TEL/N6263 PC25, PC26, PC27, PC28, PC29, PC30, PC31, PC32, PC33, PC34			8 Theory (03:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			<ul style="list-style-type: none"> <li>Explore different camera movements, such as tilting, panning, and tracking, to enhance visual appeal.</li> </ul>				
		<b>Knowledge of Drone Technology and Operations</b>	<ul style="list-style-type: none"> <li>Recognize the definition and purpose of a drone.</li> <li>Describe the historical development and milestones of drone technology.</li> <li>Identify various classifications and categories of drones and their specific functions.</li> <li>Understand the operational differences among various types of drones.</li> <li>Apply principles of aerodynamics and drone movements to understand flight dynamics.</li> <li>Demonstrate piloting skills required for controlling and maneuvering drones effectively.</li> <li>Identify common maintenance and repair procedures to ensure the optimal functioning of drones.</li> </ul>	TEL/N6263 KU1, KU2, KU3, KU4, KU5, KU6, KU7			8 Theory (03:00) Practical (05:00)
		<b>Safety and Regulatory Compliance</b>	<ul style="list-style-type: none"> <li>Explain take-off and landing procedures to ensure smooth and controlled transitions.</li> <li>Recognize the importance of adhering to safety rules and regulations governing drone operations.</li> </ul>	TEL/N6263 KU9, KU10, KU19, KU20			7 Theory (02:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			<ul style="list-style-type: none"> <li>Identify and explain the Civil Aviation Regulations (CAR) for drones established by DGCA.</li> <li>Demonstrate knowledge of drone restricted areas and forbidden zones to ensure compliance with legal and safety requirements.</li> </ul>				
		<b>Autonomous and Manual Flight Techniques</b>	<ul style="list-style-type: none"> <li>Evaluate and use autonomous flight modes for automated flight operations.</li> <li>Perform basic flight maneuvers with precision to control and direct drone movements.</li> <li>Apply obstacle avoidance and collision detection techniques to ensure safe navigation during flight.</li> </ul>	TEL/N6263 KU12, KU11, KU13			7 Theory (02:00) Practical (05:00)
		<b>Camera and Video Control Techniques</b>	<ul style="list-style-type: none"> <li>Describe manual and automated camera control methods for capturing high-quality images and videos.</li> <li>Demonstrate knowledge of aerial photography and videography techniques using drones for different types of shots.</li> </ul>	TEL/N6263 KU14, KU21			7 Theory (02:00) Practical (05:00)
		<b>Meteorology and Environmental Conditions</b>	<ul style="list-style-type: none"> <li>Explain the importance of using a pre-flight checklist for ensuring safe and successful drone operations.</li> <li>Discuss how weather conditions affect drone operations and how to adjust plans accordingly.</li> </ul>	TEL/N6263 KU8, KU22			7 Theory (02:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
3.	<b>Perform post processing and editing of photographs and footages</b>	<b>Configuring and Optimizing Workstations for Drone Media Editing</b>	<ul style="list-style-type: none"> <li>Apply strategies for configuring and fine-tuning computer settings to maximize the performance of editing software.</li> <li>Evaluate the minimum system requirements for running resource-intensive editing software and optimize the system accordingly.</li> <li>Modify and upgrade hardware components such as RAM, CPU, and GPU to meet the required specifications for high-performance editing.</li> <li>Maintain an up-to-date operating system, drivers, and editing software to ensure optimal performance.</li> <li>Organize files efficiently into a logical folder structure for seamless access and editing.</li> <li>Implement hardware acceleration techniques, including GPU offloading, to enhance processing tasks.</li> </ul>	TEL/N6264 PC1, PC2, PC3, PC4, PC5, PC6	Classroom lecture / Power-Point Presentation / Question & Answer / Group Discussion	Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Editing software (e.g., Adobe Premiere Pro, Final Cut Pro, DaVinci Resolve), Resource-intensive editing software, Hardware upgrade components (such as RAM, graphics card, storage devices), Operating system updates, Driver updates, File organization software or tools, Image and video editing software (e.g., Adobe Photoshop, Lightroom, After Effects), Back-up solutions (e.g., external hard drives,	8 Theory (02:00) Practical (06:00)
		<b>Utilizing Image and Video Editing Software for Effective Production</b>	<ul style="list-style-type: none"> <li>Analyze different image and video editing software options available and select the most suitable tools for the editing needs.</li> <li>Employ advanced editing techniques, including color correction, applying filters and effects, cropping, resizing, and stabilization, to enhance visual quality.</li> </ul>	TEL/N6264 PC7, PC8, PC9, PC10, PC11, PC12			8 Theory (02:00) Practical (06:00)



SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			<ul style="list-style-type: none"> <li>• Install and set up image and video editing software by following developer-provided instructions.</li> <li>• Integrate hardware acceleration within the editing software to improve processing speed and efficiency.</li> <li>• Utilize proxies or optimized media files to enhance editing efficiency while preserving the original quality of footage.</li> <li>• Perform high-resolution rendering processes to achieve the best output quality for video and image projects.</li> </ul>			cloud storage), Storage devices (internal or external hard drives, SSDs), Memory cards (for transferring drone files), Primary storage devices (internal hard drives), Proxy or optimized media files (to enhance editing efficiency), RAID systems (for data redundancy and protection), Backup scheduling tools or software, Training materials and resources (documentation, tutorials, sample files), Projectors or display screens for presentations, Internet connectivity (for software downloads, updates,	
		<b>Storage Management and Backup Solutions for Drone Media</b>	<ul style="list-style-type: none"> <li>• Evaluate storage space requirements for large drone photographs and footage to determine appropriate storage solutions.</li> <li>• Select and utilize external hard drives or solid-state drives (SSDs) with sufficient capacity for storing high-volume drone files.</li> <li>• Transfer drone files efficiently from memory cards or internal storage to a computer or external storage device.</li> <li>• Implement effective backup solutions to safeguard drone files from potential loss or damage.</li> <li>• Utilize cloud storage services such as Google Drive, Dropbox, or OneDrive for additional data security and accessibility.</li> </ul>	TEL/N6264 PC13, PC14, PC15, PC16, PC17, PC18, PC19			8 Theory (01:00) Practical (07:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			<ul style="list-style-type: none"> <li>Set up a RAID system to ensure data redundancy and enhanced protection of stored files.</li> <li>Establish and maintain a regular backup schedule to ensure consistent and reliable backups of all drone files.</li> </ul>			and online resources), Training room or space with suitable seating arrangements, Writing materials (pens, paper), Audiovisual equipment (microphones, speakers)	
		<b>Technical Knowledge for Selecting and Upgrading Editing Systems</b>	<ul style="list-style-type: none"> <li>Identify key specifications, including processor (CPU), RAM, and graphics card (GPU), to consider when selecting a computer for drone videography and photography.</li> <li>Recognize common computer upgrades such as adding RAM, upgrading the CPU or GPU, and installing additional storage to enhance system performance for editing tasks.</li> </ul>	TEL/N6264 KU1, KU2			8 Theory (01:00) Practical (07:00)
		<b>Media Optimization Techniques for Efficient Editing</b>	<ul style="list-style-type: none"> <li>Explain the concept of proxies or optimized media files, which are lower-resolution versions of video files used to reduce processing demands while editing.</li> </ul>	TEL/N6264 KU3			7 Theory (01:00) Practical (06:00)
		<b>Software and Tools for Image and Video Editing</b>	<ul style="list-style-type: none"> <li>Compare popular image editing tools such as Adobe Photoshop, GIMP, and Affinity Photo, and video editing software options like Adobe Premiere Pro, Final Cut Pro, and DaVinci Resolve to determine their suitability for different editing needs.</li> </ul>	TEL/N6264 KU4			7 Theory (01:00) Practical (06:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		<b>Drone Technology and Videography Planning</b>	<ul style="list-style-type: none"> <li>Define key drone technology concepts, including various types of drones, their components, and operational mechanics.</li> <li>Plan and prepare for drone videography and photography by scouting locations, pre-visualizing shots, and considering lighting conditions and weather.</li> <li>Describe the regulatory frameworks, including FAA regulations and local laws, governing drone videography and photography practices.</li> </ul>	TEL/N6264 KU5, KU6, KU7			7 Theory (01:00) Practical (06:00)
		<b>Effective Drone Operation and Visual Composition</b>	<ul style="list-style-type: none"> <li>Apply camera settings on a drone to capture high-quality video and images, ensuring optimal visual results.</li> <li>Utilize flight modes and drone maneuvers to achieve smooth and stable footage.</li> <li>Compose and frame shots to create visually appealing videos and images, focusing on creative storytelling.</li> <li>Develop narrative techniques in drone videography and photography to tell compelling stories through visual content.</li> </ul>	TEL/N6264 KU8, KU9, KU10, KU11			7 Theory (01:00) Practical (06:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
4.	<b>Preventive maintenance and troubleshooting of drones and related accessories</b>	<b>Drone Diagnosis and Problem Identification</b>	<ul style="list-style-type: none"> <li>Identify abnormal behavior, error messages, and visual cues exhibited by the drone and its accessories.</li> <li>Analyze flight logs to assess the drone's performance, including flight duration, altitude, speed, battery voltage, and recorded errors.</li> <li>Apply troubleshooting techniques to resolve common issues using the drone's user manual, manufacturer's website, or online forums.</li> <li>Calibrate the utilities, sensor status indicators, or connectivity testers of the drones.</li> <li>Evaluate and diagnose problems systematically to determine the root cause of the issue.</li> </ul>	TEL/N6265 PC1, PC2, PC3, PC4, PC6	Classroom lecture / Power-Point Presentation / Question & Answer / Group Discussion	Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Drones, Drone accessories (propellers, batteries, chargers, gimbals, ND filters, etc.), Flight logs (to analyze drone performance data), User manuals (for troubleshooting guides and information on specific drone models), Manufacturer websites (for accessing documentation and resources), Online forums (for community support and discussions), Calibration utilities or tools (for sensor status indicators, connectivity testers),	8 Theory (03:00) Practical (05:00)
		<b>Drone Maintenance and Repair Fundamentals</b>	<ul style="list-style-type: none"> <li>Analyze the relationship between drone components like frame, motors, propellers, battery, camera, gimbal, and additional accessories for proper operation.</li> <li>Implement preventive maintenance tasks, ensuring the cleanliness of the drone and its accessories to prevent performance issues.</li> <li>Utilize soft brushes or compressed air to clean motors, propellers, and other critical areas of the drone.</li> </ul>	TEL/N6265 PC7, PC8, PC9, PC11, PC13			8 Theory (03:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			<ul style="list-style-type: none"> <li>Calibrate the drone's sensors, compass, and gimbal to maintain operational efficiency.</li> <li>Follow best practices for battery care, including proper storage, charging, and handling precautions.</li> </ul>			Maintenance tools (such as soft brushes, compressed air, screwdrivers), Firmware update tools (specific to drone models), Visual inspection tools (to identify damage or malfunction), Spare parts (for replacement during practical training sessions), Battery health check tools (to assess battery condition), Instructional materials (documentation, tutorials, sample flight logs), Projectors or display screens for presentations, Training room or space with suitable seating arrangements, Writing materials (pens, paper),	
		<b>Repair and Component Replacement</b>	<ul style="list-style-type: none"> <li>Examine and replace faulty parts after thorough inspection of the drone and its accessories.</li> <li>Evaluate the battery condition regularly for signs of damage or swelling and replace if necessary.</li> <li>Remove malfunctioning drones from the relevant person and perform necessary repairs to restore functionality.</li> </ul>	TEL/N6265 PC12, PC14, PC19			8 Theory (03:00) Practical (05:00)
		<b>Accessory Maintenance and Calibration</b>	<ul style="list-style-type: none"> <li>Identify which accessories require repair or maintenance, including propellers, batteries, chargers, remote controllers, camera gimbals, ND filters, and landing gear.</li> <li>Inspect each accessory for visible damage, wear, or malfunction, ensuring optimal operation.</li> <li>Calibrate the camera gimbals to maintain stable and accurate footage capture.</li> <li>Identify and repair issues with drone accessories to ensure proper functionality.</li> </ul>	TEL/N6265 PC15, PC16, PC17, PC18			8 Theory (03:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		<b>Aviation and Drone Operations</b>	<ul style="list-style-type: none"> <li>Recognize the operations of various types of drones and understand how they differ in their flight capabilities.</li> <li>Apply the principles of aerodynamics and drone movements to execute effective and safe flight.</li> <li>Demonstrate drone piloting skills by controlling and maneuvering the drone during flight operations.</li> <li>Perform basic flight maneuvers, ensuring precision and control during drone operation.</li> </ul>	TEL/N6265 KU4, KU6, KU7, KU12		Audiovisual equipment (micro-phones, speakers), Internet connectivity (for accessing online resources and forums), Computer or laptop (for analyzing flight logs and accessing digital resources), Flight simulators (for virtual training exercises)	7 Theory (02:00) Practical (05:00)
		<b>Drone Safety, Regulations, and Legal Compliance</b>	<ul style="list-style-type: none"> <li>Apply drone safety rules and regulations to comply with legal requirements and maintain safe operations.</li> <li>Execute pre-flight checklists to ensure safety and success during drone operations.</li> <li>Follow take-off and landing procedures to ensure smooth transitions and avoid accidents during drone operations.</li> </ul>	TEL/N6265 KU11, KU9, KU10			7 Theory (02:00) Practical (05:00)
		<b>Autonomous Flight and Navigation</b>	<ul style="list-style-type: none"> <li>Analyze autonomous flight modes and their functionalities to optimize drone operation.</li> <li>Implement obstacle avoidance and collision detection techniques to navigate drones safely and prevent accidents.</li> </ul>	TEL/N6265 KU13, KU14			7 Theory (02:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		<b>Data Analysis and Software Management</b>	<ul style="list-style-type: none"> <li>Utilize data logging and analysis techniques to track and analyze flight performance data.</li> <li>Apply software updates and calibration techniques to keep the drone's software and sensors up to date, ensuring high performance.</li> </ul>	TEL/N6265 KU16, KU20			7 Theory (02:00) Practical (05:00)
5.	<b>Use drone photography in various sectors</b>	<b>Basic Operational Skills in Drone Usage</b>	<ul style="list-style-type: none"> <li>Operate drones effectively to capture aerial photographs of real estate properties, agricultural fields, and other relevant sectors.</li> <li>Maneuver drones to navigate through challenging terrains, varying weather conditions, and complex environments.</li> <li>Control drones proficiently to provide real-time situational awareness for surveillance and inspection purposes.</li> </ul>	TEL/N6266 PC1, PC7, PC21, PC22, PC23, PC24	Classroom lecture / Power-Point Presentation / Question & Answer / Group Discussion	Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Drones, Drone accessories (propellers, batteries, chargers, gimbals, ND filters, etc.), Flight logs (to analyze drone performance data), User manuals (for troubleshooting guides and information on specific drone models), Manufacturer websites (for accessing documentation and resources), Online forums (for community support and discussions),	8 Theory (06:00) Practical (02:00)
		<b>Advanced Techniques in Aerial Imaging and Analysis</b>	<ul style="list-style-type: none"> <li>Develop the ability to capture wide-angle shots or panoramic views that provide a comprehensive overview of properties, agricultural fields, and landscapes.</li> <li>Analyze aerial imagery to assess crop health, identify stress areas, and monitor overall conditions by interpreting visual cues and advanced imagery data.</li> </ul>	TEL/N6266 PC3, PC9, PC13, PC14, KU2, KU6, KU8, KU10			8 Theory (06:00) Practical (02:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			<ul style="list-style-type: none"> <li>Integrate multispectral or thermal camera technologies into drones for detailed crop and environmental analysis.</li> <li>Evaluate the latest emerging trends in drone technology and how they shape the industry.</li> </ul>			Calibration utilities or tools (for sensor status indicators, connectivity testers), Maintenance tools (such as soft brushes, compressed air, screwdrivers), Firmware update tools (specific to drone models), Visual inspection tools (to identify damage or malfunction), Spare parts (for replacement during practical training sessions), Battery health check tools (to assess battery condition), Instructional materials (documentation, tutorials, sample flight logs), Projectors or display screens for presentations,	
		<b>Drone Videography and Photography in Media and Marketing</b>	<ul style="list-style-type: none"> <li>Create high-quality, captivating drone videos and photos for real estate, tourism, media, and other industries.</li> <li>Develop skills in editing and refining drone footage to enhance the visual appeal and storytelling aspect of promotional materials.</li> <li>Integrate sound effects and music into drone videos to create a compelling viewer experience.</li> <li>Utilize drone videography for marketing and promotional campaigns, highlighting key features of properties, tourist destinations, and events.</li> </ul>	TEL/N6266 PC4, PC5, PC6, PC16, PC18, PC19, PC20, KU5, KU9, KU11, KU14			8 Theory (06:00) Practical (02:00)



SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		<b>Theoretical Knowledge and Applications of Drone Technology</b>	<ul style="list-style-type: none"> <li>Apply knowledge of field size, crop type, and resolution to plan efficient drone flights for agricultural analysis.</li> <li>Develop the ability to interpret aerial imagery and integrate it into existing systems to monitor crop conditions or improve operational efficiency.</li> <li>Understand the role of drone sensors, camera settings, and post-processing techniques to enhance various types of drone footage for real estate, media, and agriculture.</li> <li>Analyze how drone videography influences the advertising and marketing sectors by creating impactful visuals that engage audiences.</li> </ul>	TEL/N6266 PC10, PC11, PC12, PC15, KU1, KU3, KU4, KU7, KU12, KU15, KU16, KU18, KU19		Training room or space with suitable seating arrangements, Writing materials (pens, paper), Audiovisual equipment (microphones, speakers), Internet connectivity (for accessing online resources and forums), Computer or laptop (for analyzing flight logs and accessing digital resources), Flight simulators (for virtual training exercises)	6 Theory (02:00) Practical (04:00)
<b>Total Duration</b>							Theory: 90:00 Practical: 150:00
<b>Employability Skills (DGT/VSQ/N0102)</b> ( <a href="https://www.skillindiadigital.gov.in/content/list">https://www.skillindiadigital.gov.in/content/list</a> )							60:00
<b>OJT</b>							120:00
<b>Total Duration</b>							PR + TH + OJT + ES = 420 : 00

## Annexure II

### Assessment Criteria

#### CRITERIA FOR ASSESSMENT OF TRAINEES

Assessment Criteria for Dron-O-Grapher	
Job Role	Dron-O-Grapher
Qualification Pack	TEL/Q6221, V1.0
Sector Skill Council	Telecom Sector Skill Council

S. No.	Guidelines for Assessment
1	The assessment for the theory part will be based on knowledge bank of questions approved by the SSC.
2	Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/ Set of NOS.
3	Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below).
4	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on this criterion.
5	To pass the Qualifications File, every trainee should score a minimum of 50% of aggregate marks.
6	In case of unsuccessful completion, the trainee may seek reassessment on the Qualification File.

Assessment Outcomes	Assessment Criteria for Outcomes	Marks Allocation		
		Theory	Practical	Viva
<b>TEL/N6263: Operate drone and camera accessories</b>	Pre operations checks	9	16	3
	PC1. ensure that the drone's battery is fully charged and securely connected	1	2	-
	PC2. check for any damage or signs of wear on the battery and its connectors	1	1	-
	PC3. inspect the propellers for any cracks, chips, or other damage. Ensure that they are properly mounted and tightened	1	1	-
	PC4. check that all flight controls, including the throttle, yaw, pitch, and roll, are functioning correctly and responding appropriately	1	2	1
	PC5. verify that the drone's GPS and compass are calibrated and functioning properly	1	1	1
	PC6. inspect the camera and gimbal for any damage or misalignment	-	3	-
	PC7. ensure that a suitable memory card/storage device is inserted into the camera and has sufficient storage capacity for capturing footage	1	2	-
	PC8. check that the remote controller is fully charged and functioning properly	1	1	-
	PC9. verify that the control sticks, buttons, and switches are responsive	1	1	-
	PC10. make sure that the drone's firmware and any companion software on connected devices are up to date	-	1	-

PC11. assess the current weather conditions and check for any weather advisories or restrictions that may affect safe drone operation	1	1	1
Conduct flight operations	13	32	4
PC12. power on the drone and remote controller	1	2	1
PC13. perform a final check of the drone's sensors, GPS lock, and flight mode	1	3	-
PC14. slowly increase the throttle to lift the drone off the ground	1	2	-
PC15. maintain a steady ascent while monitoring the drone's altitude and stability	1	3	-
PC16. follow the planned flight path while maintaining a safe distance from obstacles and restricted areas	1	3	1
PC17. monitor the drone's battery level and return to the landing zone if it reaches a low level	1	2	-
PC18. keep visual contact with the drone at all times and maintain situational awareness	1	3	-
PC19. adjust the camera settings and angles to capture the desired footage or images	1	2	1
PC20. monitor the drone's telemetry data, such as altitude, speed, and battery level, for safe and controlled flight	1	2	-
PC21. identify a suitable landing zone that is clear of people and obstacles	1	2	-
PC22. descend the drone slowly and steadily	1	3	-
PC23. use the remote controller to guide the drone to the landing zone	1	2	1
PC24. power off the drone and remote controller after a successful landing	1	3	-
Capture drone video and aerial photography	8	12	3
PC25. adjust camera settings such as resolution, frame rate, ISO, white balance, etc. based on your desired outcome	1	-	1
PC26. assess the lighting conditions at the location	1	1	-
PC27. fly the drone to the desired location to capture the photos or videos	1	1	-
PC28. ensure the drone is stable before taking any shots	-	2	-
PC29. use the live feed from the drone's camera to frame the shot	1	1	1
PC30. adjust the drone's position and orientation to achieve the desired composition	1	1	-
PC31. use the camera controls on the drone's remote controller or mobile app to capture photos	-	2	-
PC32. switch to video mode on drone's camera to start recording drone footage	1	1	-
PC33. maintain smooth and controlled maneuvers while operating the drone to avoid shaky footage/images	1	2	1
PC34. explore different camera movements, such as tilting, panning, or tracking, to add visual interest to the shots	1	1	-
<b>NOS Total</b>	<b>30</b>	<b>60</b>	<b>10</b>

<b>TEL/N6264: Perform post processing and editing of photographs and footages</b>	Optimize and maintain editing workstations for drone media processing	10	20	3
	PC1. configure and fine-tuning computer settings to maximize performance	2	3	1
	PC2. ensure that the computer meets the minimum requirements for running resource- intensive editing software	1	4	-
	PC3. upgrade computer hardware if it does not fulfill the required specifications	2	3	-
	PC4. update computer's operating system, drivers, and editing software regularly	2	3	-
	PC5. organize files into a logical folder structure	1	4	1
	PC6. utilize hardware acceleration, such as supporting GPU offloading for processing tasks	2	3	1
	Use image and video editing software	10	20	4
	PC7. research different image and video editing software options available	2	3	-
	PC8. use features such as colour correction, filters and effects, cropping and resizing tools, stabilization, and other functions that are important for your editing goals	1	3	1
	PC9. follow the instructions provided by the developer to download and install it on the computer	2	4	1
	PC10. enable hardware acceleration within your editing software's settings, if available	2	3	1
	PC11. use proxies or optimized media files to enhance editing efficiency while preserving the original quality of the media	1	3	1
	PC12. perform rendering of high-resolution files for the best output quality	2	4	-
	Engage with ample amount of storage and backup solutions	10	20	3
	PC13. evaluate the storage space needed for drone photographs and footage	1	3	1
	PC14. utilise external hard drives or solid-state drives (SSDs) with sufficient capacity to accommodate the obtained files	2	3	-
	PC15. transfer the drone files from drone's memory card or internal storage to the allocated computer's primary storage device or the external hard drives that is acquired	2	2	-
	PC16. protect drone files from loss or damage by implementing backup solutions	2	3	-
	PC17. use cloud storage services such as Google Drive, Dropbox, or Microsoft OneDrive	1	3	1
	PC18. set up a RAID (Redundant Array of Independent Disks) system that provide increased data redundancy and protection	1	3	-
	PC19. set up a regular backup schedule to ensure that your drone files are consistently backed up	1	3	1
	<b>NOS Total</b>	<b>30</b>	<b>60</b>	<b>10</b>
<b>TEL/N6265: Preventive maintenance and troubleshooting of drones and related accessories</b>	Interpret Drone related issues	10	20	3
	PC1. pay close attention to any abnormal behavior, error messages, or visual cues like flight patterns, video transmission issues, gimbal instability, or warning lights on the controller exhibited by the drone or its accessories	2	3	1

	PC2. analyze the flight logs to gain insights into the drone's performance, including flight duration, altitude, speed, battery voltage, and any recorded errors	1	4	-
	PC3. consult the drone's user manual, manufacturer's website, or online forums for troubleshooting guides and common issues related to your specific drone model	2	3	-
	PC4. calibrate utilities, sensor status indicators, or connectivity testers of the drones	2	3	-
	PC5. regularly perform preventive maintenance tasks recommended by the manufacturer that include cleaning the drone and its accessories, inspecting cables and connectors for wear or damage, checking battery health, and performing firmware updates	1	4	1
	PC6. follow a systematic approach to isolate and identify the root cause of the problem	2	3	1
	Perform repair and maintenance of drones	10	20	4
	PC7. understand how the components like frame, motors, propellers, battery, camera, gimbal, and any additional accessories work together to ensure proper operation	2	3	-
	PC8. keep the drone and its accessories clean to prevent dirt, dust, and debris from affecting its performance	1	3	1
	PC9. use a soft brush or compressed air to remove debris from the motors, propellers, and other areas	2	4	1
	PC10. keep the drone's firmware up to date ensures that it benefits from bug fixes, stability improvements, and new features	1	3	1
	PC11. calibrate the drone's sensors, compass, and gimbal	1	3	1
	PC12. replace the faulty parts after inspection	1	2	-
	PC13. follow the manufacturer's guidelines for battery care, including storage temperature, charging practices, and handling precautions	1	1	-
	PC14. inspect the battery regularly for any signs of damage or swelling and replace it if necessary	1	1	-
	Perform repair and maintenance of accessories	10	20	3
	PC15. identify the specific accessories that require repair and maintenance. These may include propellers, batteries, chargers, remote controllers, camera gimbals, ND filters, landing gear, or any other accessories used with your drone	1	5	1
	PC16. carefully inspect each accessory for any visible signs of damage, wear, or malfunction	4	5	-
	PC17. look for cracks, dents, loose connections, frayed wires, or any other abnormalities	2	5	1
	PC18. calibrate the camera gimbals to ensure proper operations	2	3	1
	PC19. take away the malfunctioning drone from the relevant person	1	2	-
	<b>NOS Total</b>	<b>30</b>	<b>60</b>	<b>10</b>
<b>TEL/N6266: Use drone photography in various sectors</b>	Use of drones in Real Estate	7	15	3
	PC1. operate the drone effectively to capture high- quality aerial photographs of real estate properties i.e. property's features, surrounding landscapes, and amenities	2	2	1
	PC2. use drone photography to emphasize key features of the property, such as pool areas, gardens, outdoor living spaces, or architectural details	1	3	1

PC3. capture wide-angle shots or panoramic views of the property to provide potential buyers with a comprehensive overview of the entire property layout and surrounding areas	1	2	-
PC4. possess skills in editing drone photographs to enhance their visual appeal and showcase the property in the best possible light	1	3	-
PC5. create captivating drone videos of the property, showcasing the exterior and interior spaces, amenities, and surrounding landscapes	1	3	-
PC6. proficient in capturing smooth and cinematic footage, incorporating transitions, and adding appropriate music or voiceovers to create engaging real estate videos	1	2	1
Utilize drone technology in Agriculture	10	20	3
PC7. operate a drone equipped with a camera to capture high-resolution aerial photographs of agricultural fields, crops, and surrounding areas	1	2	-
PC8. understand the drone's controls, camera settings, and flight techniques to obtain clear and well-composed images	1	2	1
PC9. analyze aerial imagery to assess crop health, identify areas of stress, disease, or nutrient deficiencies, and monitor overall crop conditions	1	3	-
PC10. develop the ability to interpret visual cues in the imagery and correlate them with agronomic knowledge to make informed decisions	1	2	-
PC11. plan and execute efficient flight paths over agricultural fields to ensure comprehensive coverage and minimize overlap	2	3	1
PC12. consider factors such as field size, crop type, and desired image resolution	1	2	-
PC13. integrate remote sensing technologies such as multispectral or thermal cameras into the drone platform	1	2	-
PC14. interpret color variations, vegetation indices, and other data layers to assess crop vigor, growth patterns, or pest infestations	1	2	1
PC15. integrate aerial imagery data into existing farm management systems or precision agriculture platforms	1	2	-
Use of drones in Media and Journalism	5	10	2
PC16. operate the drone to capture high-quality aerial footage of news events, social issues, natural disasters, or other relevant subjects	2	5	1
PC17. capture aerial shots that give a broader perspective, highlighting the scale of events, showcasing geographical features, or revealing unique angles that ground-level photography cannot capture	3	5	1
Use of drones in Tourism and Hospitality	5	10	2
PC18. utilize drone photography to capture stunning aerial views of tourist destinations, hotels, and resorts	1	2	-
PC19. use drone photography to showcase the property's amenities, such as pools, gardens, golf courses, or beachfront access	2	3	1
PC20. use drone photography to create engaging promotional content, including videos and images, that can be used in marketing campaigns, websites, social media, and brochures	2	5	1
Use of drones in other sectors	3	5	-
PC21. control and maneuver drones to navigate through challenging terrains, varying weather conditions, and complex environments.	1	1	-
PC22. assess live footage, thermal imaging, or other sensor data to identify potential signs of individuals in distress.	-	1	-






	PC23. inspect power lines, transmission towers, and other energy infrastructure	1	1	-
	PC24. operate drones proficiently for aerial surveillance, providing real-time situational awareness in critical situations	1	-	-
	PC25. leverage drone technology for search and rescue missions by employing advanced imaging capabilities	-	1	-
	PC26. utilize drones to conduct regular aerial surveys of transportation and logistics facilities, enabling the quick and accurate assessment of inventory levels, storage conditions, and overall operational efficiency	-	1	-
	<b>NOS Total</b>	<b>30</b>	<b>60</b>	<b>10</b>
<b>DGT/VSQ/N0102: Employability Skills (60 Hours)</b>	Introduction to Employability Skills	1	1	-
	PC1. identify employability skills required for jobs in various industries	-	-	-
	PC2. identify and explore learning and employability portals	-	-	-
	Constitutional values – Citizenship	1	1	-
	PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.	-	-	-
	PC4. follow environmentally sustainable practices	-	-	-
	Becoming a Professional in the 21st Century	2	4	-
	PC5. recognize the significance of 21st Century Skills for employment	-	-	-
	PC6. practice the 21st Century Skills such as Self- Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-
	Basic English Skills	2	3	-
	PC7. use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-
	PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-
	PC9. write short messages, notes, letters, e-mails etc. in English	-	-	-
	Career Development & Goal Setting	1	2	-
	PC10. understand the difference between job and career	-	-	-
	PC11. prepare a career development plan with short- and long-term goals, based on aptitude	-	-	-
	Communication Skills	2	2	-
	PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings	-	-	-
	PC13. work collaboratively with others in a team	-	-	-
	Diversity & Inclusion	1	2	-
	PC14. communicate and behave appropriately with all genders and PwD	-	-	-
	PC15. escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-
	Financial and Legal Literacy	2	3	-
	PC16. select financial institutions, products and services as per requirement	-	-	-






PC17. carry out offline and online financial transactions, safely and securely	-	-	-
PC18. identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-
PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-
Essential Digital Skills	3	4	-
PC20. operate digital devices and carry out basic internet operations securely and safely	-	-	-
PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively	-	-	-
PC22. use basic features of word processor, spreadsheets, and presentations	-	-	-
Entrepreneurship	2	3	-
PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-
PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-
PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-
Customer Service	1	2	-
PC26. identify different types of customers	-	-	-
PC27. identify and respond to customer requests and needs in a professional manner.	-	-	-
PC28. follow appropriate hygiene and grooming standards	-	-	-
Getting ready for apprenticeship & Jobs	2	3	-
PC29. create a professional Curriculum vitae (Résumé)	-	-	-
PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-
PC31. apply to identified job openings using offline/online methods as per requirement	-	-	-
PC32. answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-
PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-
<b>NOS Total</b>	<b>20</b>	<b>30</b>	<b>-</b>




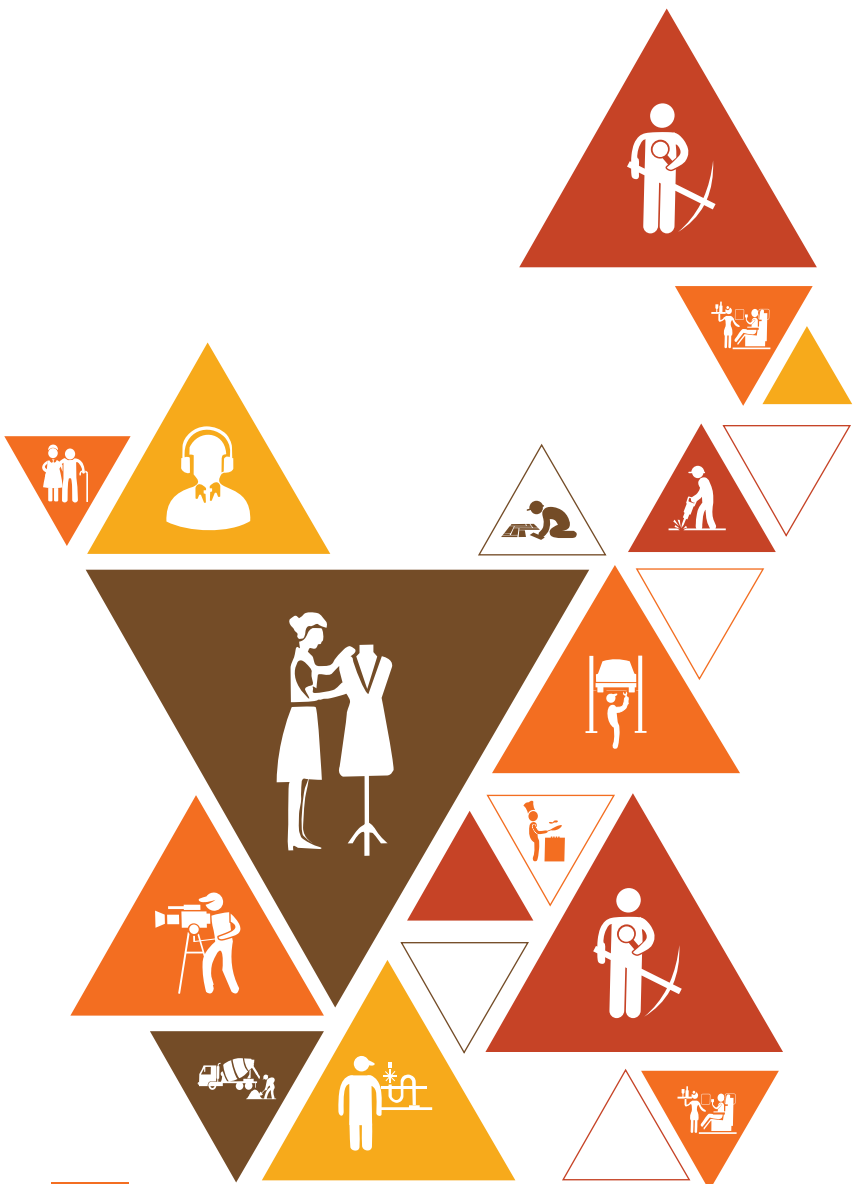
## Annexure III

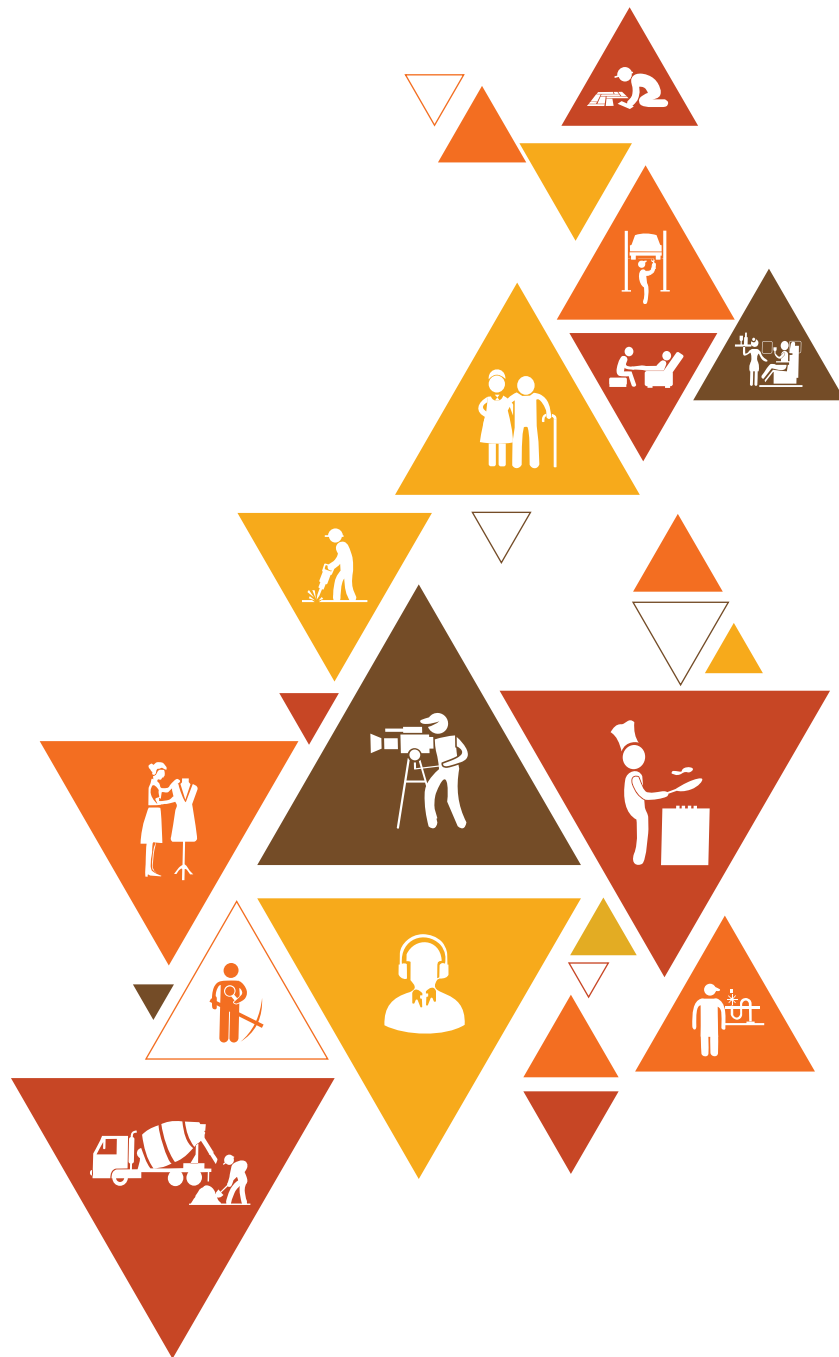
### List of QR Codes Used in PHB

Module No.	Unit No.	Topic Name	Page No. in PHB	Link for QR Code (s)	QR code (s)
<b>Module 1: Introduction to the Role of a Dron-o-Grapher</b>	Unit 1.1: Industry Overview and Organisational Context	1.1.1 Size and scope of the Telecom Industry and its Sub-Sectors	27	<a href="https://youtu.be/0DBLx-RtWVuA">https://youtu.be/0DBLx-RtWVuA</a>	 Indian Telecom industry evolution and its subsectors
	Unit 1.2: Role and Responsibilities of a Drone-o-Grapher	1.2.3 DGCA Guidelines for Drones	27	<a href="https://youtu.be/zUx-9G6VPuH">https://youtu.be/zUx-9G6VPuH</a>	 Conditions to fly a drone
<b>Module 2: Operate Drone and Camera Accessories</b>	Unit 2.1: BIM Modeling Process and Stakeholder Management	2.1.2 Performing Pre-Flight Inspection of a Drone	73	<a href="https://youtu.be/KillgW066il">https://youtu.be/KillgW066il</a>	 TOP 5 : Best BIM (Building Information Modeling) Software
	Unit 2.2: Drone Operation and Footage Capture	2.2.1 Sales Reporting Systems Used in the Pharmaceutical Sector	73	<a href="https://youtu.be/G6Hn1sXuJT8">https://youtu.be/G6Hn1sXuJT8</a>	 Operating a drone
<b>Module 3: Perform Post Processing and Editing of Photographs and Footage</b>	Unit 3.1: Optimizing Computer and Software for Editing Tasks	3.1.1 Minimum Hardware Requirements for Running Resource-Intensive Editing Software	112	<a href="https://youtu.be/XZMVOp3y-aw">https://youtu.be/XZMVOp3y-aw</a>	 Hardwares of drone camera

Module No.	Unit No.	Topic Name	Page No. in PHB	Link for QR Code (s)	QR code (s)
	Unit 3.2 Regulatory Guidelines for Adverse Event Reporting	3.2.2 Installing and Setting Up Image and Video Editing Software	112	<a href="https://youtu.be/A7qIJcsEjmY">https://youtu.be/A7qIJcsEjmY</a>	 Setting up drone camera
	Unit 3.3: File Management and Data Backup	3.3.4 Transferring Drone Files to Internal/External Storage	112	<a href="https://youtu.be/zyWdNjsX-VXU">https://youtu.be/zyWdNjsX-VXU</a>	 Transferring Drone Files to Internal/External Storage
<b>Module 4: Pre-ventive Maintenance and Troubleshooting of Drones and Related Accessories</b>	Unit 4.1: Identifying and Diagnosing Drone Issues	4.1.4 Functional Interdependencies Between Drone Components	141	<a href="https://youtu.be/Gdzwfci7AYE">https://youtu.be/Gdzwfci7AYE</a>	 Drone components performance review
	Unit 4.2: Preventive Maintenance and Repair of Drones	4.2.1 Preventive Maintenance of Drones	141	<a href="https://youtu.be/clvK8R7YMrs">https://youtu.be/clvK8R7YMrs</a>	 Drone maintenance
<b>Module 5: Use drone photography in various sectors</b>	Unit 5.1 Workplace Health and Safety Regulations and Best Practices	5.1.7 Using Drone Photography to Create Promotional Content for Marketing Campaigns	171	<a href="https://youtu.be/YdnqEilvt00">https://youtu.be/YdnqEilvt00</a>	 Aerial seed copter crone marketing campaign

Module No.	Unit No.	Topic Name	Page No. in PHB	Link for QR Code (s)	QR code (s)
	Unit 5.2: Specialized Drone Applications	5.1.2 Advanced Imaging Capabilities of Drones in Search and Rescue Missions	171	<a href="https://youtu.be/6jkUYY6HjHg">https://youtu.be/6jkUYY6HjHg</a>	 <p>Drone rescue technology is disaster response</p>







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