Model Curriculum

QP Name: Drone Monitoring and Maintenance Associate

QP Code: TEL/Q6217

Version: 1.0

NSQF Level: 3

Model Curriculum Version: 1.0

Telecom Sector Skill Council || 3rd Floor, Plot No 126, Sector – 44
Gurgaon - 122003

Table of Contents

Training Parameters

Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Network Operation and Maintenance
Country	India
NSQF Level	3
Aligned to NCO/ISCO/ISIC Code	NCO-2015/1330.6217
Minimum Educational Qualification and Experience	Class 10th Pass **OR** Class 8th Pass and pursuing continuous regular schooling **OR** Class 8th Pass + ITI (2 years in Electronics/Telecom/IT and other relevant fields)
Pre-Requisite License or Training	NA
Minimum Job Entry Age	15 Years
Last Reviewed On	30/06/2022
Next Review Date	30/06/2025
NSQC Approval Date	30/06/2022
QP Version	1.0
Model Curriculum Creation Date	30/06/2022
Model Curriculum Valid Up to Date	30/06/2025
Model Curriculum Version	1.0
Minimum Duration of the Course	390 Hours
Maximum Duration of the Course	390 Hours

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills to:

- Describe the process of managing and analysing drone data.
- Demonstrate the process of operating and maintaining the drone system.
- Explain the importance of organising work and resources as per health and safety standards.
- Explain the importance of of interacting effectively with team members and customers.

Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
Bridge Module	**08:00**	**04:00**	**12:00**	**-**	**24:00**
Module 1: Introduction to the role of a Drone Monitoring and Maintenance Associate	08:00	04:00	12:00	-	24:00
TEL/N6258: Manage and Analyse Drone Data **NOS Version-1.0** **NSQF Level- 3**	**40:00**	**46:00**	**54:00**	**-**	**140:00**
Module 2: Process of managing and analysing drone data	40:00	46:00	54:00	-	140:00
TEL/N6259: Operate and Maintain the Drone System **NOS Version-1.0** **NSQF Level- 3**	**40:00**	**52:00**	**54:00**	**-**	**146:00**
Module 3: Process of operating and maintaining the drone system	40:00	52:00	54:00	-	146:00
TEL/N9101: Organise Work and Resources as per Health and Safety Standards **NOS Version-1.0**	**16:00**	**24:00**	**00:00**	**-**	**40:00**

NSQF Level-4					
Module 4: Process of organising work and resources as per health and Safety standards	16:00	24:00	00:00	-	40:00
TEL/N9102: Interact Effectively with Team Members and Customers **NOS Version-1.0** **NSQF Level-4**	**16:00**	**24:00**	**00:00**	**-**	**40:00**
Module 5: Process of interacting effectively with team members and customers	16:00	24:00	00:00	-	40:00
Total Duration	**120:00**	**150:00**	**120:00**	**-**	**390:00**

Module Details

Module 1: Introduction to the role of a Drone Monitoring and Maintenance Associate

Bridge Module

Terminal Outcomes:

- Discuss the job role of a Drone Monitoring and Maintenance Associate.

- Explain the scope of work for a Drone Monitoring and Maintenance Associate.

Duration: 08:00	Duration: 04:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Describe the size and scope of the Telecom industry and its sub-sectors. - Discuss the role and responsibilities of a Drone Monitoring and Maintenance Associate. - Identify various employment opportunities for a Drone Monitoring and Maintenance Associate. - Discuss the organisational policies on workplace ethics, managing sites, quality standards, personnel management and public relations (PR). - Describe the process workflow in the organization and the role of a Drone Monitoring and Maintenance Associate in the process. - List the various daily, weekly, monthly operations/activities that take place at the site under a Drone Monitoring and Maintenance Associate.	- Role play based on case studies, outlining the scope, responsibilities, and challenges of a Drone Monitoring and Maintenance Associate. - Analyse the requirements for the course and prepare for the pre-requisites of the course.
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films	
Tools, Equipment and Other Requirements	
NA	

Module 2: Process of managing and analysing drone data
Mapped to TEL/N6258 v1.0

Terminal Outcomes:

- Demonstrate the process of testing the data transmission.
- Demonstrate the process of retrieving and analysing the drone data.

Duration: 40:00	Duration: 46:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the process of data transmission from a 5G enabled drone. • Explain the benefit of using a cloud server and how it processes data. • Describe the process of conducting the appropriate tests to ensure connectivity between the drone and the command-and-control communication system through 5G. • Explain how to identify errors and anomalies in the data and appropriate measures to be taken to rectify them. • Explain the use of the appropriate data processing software for various tasks, such as image geotagging and calculating the overlap.	• Demonstrate how to connect the drone with the command-and-control communication system using the 5G network and with the appropriate cloud server. • Demonstrate the process of conducting the relevant tests to ensure data uplink, and downlink take place without any issues over the 5G network. • Demonstrate the process of carrying out troubleshooting for any issues identified during the test. • Show how to retrieve the drone data for processing on a local computer and determine the size of the dataset. • Demonstrate how to calibrate and process the drone data according to the requirement and organisational procedure. • Demonstrate the process of carrying out photogrammetry to obtain relevant information about physical objects and the environment through measurement and interpretation of images recorded by the drone. • Show how to use the appropriate data processing software for tasks, such as image geotagging and calculating the overlap. • Demonstrate the process of creating high-accuracy maps and 3D models through data analysis. • Prepare sample reports with respect to data analysis and draw

	appropriate conclusions.

Classroom Aids

Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop

Tools, Equipment and Other Requirements

Drone, Laptop/Desktop with pre-installed Data Processing Software, Such as Image Geotagging and Calculating the Overlap, High-Accuracy Maps And 3D Models, Data Analysis Software.

Telecom Sector Skill Council

Skill India
स्वस्थ भारत - कुशल भारत

N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape

Module 3: Process of operating and maintaining the drone system
Mapped to TEL/N6259 v1.0

Terminal Outcomes:

- Demonstrate the process of preparing for drone operations.
- Demonstrate the process of operating and maintaining the drone system.

Duration: 40:00	Duration: 52:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Explain the benefit of operating drone on a 5G network, such as high reliability and low-latency connectivity. - Explain different benefits of using 5G enabled drones, such as effective and real-time surveillance, asset inspection, swarm mapping, delivery, etc. - State the regulations applicable to the operations of automated and pilot-operated drones, such as low-altitude airspace restrictions. - Describe the process of preparing a drone for operations and the relevant troubleshooting to be carried out for common issues. - Explain the importance of maintaining constant communication with the drone traffic management system during the drone flight and following their instructions. - Explain the importance of using the appropriate mechanism to allow the relevant authorities to identify the drone, ensuring the identification process is tamper-resistant. - Explain the benefit and process of using the 5G network connectivity for autonomous drone activity. - Explain the benefit of using the 5G network connectivity for real-time control and operations of a drone out of the Visual Line of Sight (VLOS). - Explain the benefit and process of using the relevant 5G mobile network tools for effective user	- Demonstrate how to test the receipt of 5G signals by the drone and conduct a test flight to ensure the correct functioning of the drone, such as the visuals and data reported by the drone. - Demonstrate the process of carrying out troubleshooting for any issues identified with the drone during testing, following the manufacturer's instructions. - Show how to use the 5G enabled drone for surveillance, intelligence gathering, industrial mapping, delivery, filming and photography, etc. - Show how to control the drone using the command-and-control communication system. - Demonstrate how to broadcast the appropriate signals by drone through the 5G network. - Demonstrate the use of the 5G network connectivity for autonomous drone activity such as precision monitoring and mapping, according to the capability of the drone. - Show how to utilise the appropriate network publishing solutions to publish data on a remote server, such as the drone traffic management system, using 5G network connectivity. - Demonstrate the use of the payload data transmission system to support the applications onboard the drone,

identification, access authorisation, and geo-fencing	such as high bandwidth video streaming.
• Describe the procedure to be followed for the safe landing of the drone during an emergency, such as unfavourable weather.	• Demonstrate the use of the 5G network connectivity to operate the drone out of the Visual Line of Sight (VLOS), monitoring its path to avoid collision with other drones or Unmanned Aerial Vehicles (UAVs).
• Explain the importance of using the manufacturer-approved spare parts and maintenance tools and equipment for repair and replacement activities	• Demonstrate the use of the relevant 5G mobile network tools for effective user identification, access authorisation, and geo-fencing.
• Explain the importance of ensuring the correcting functioning of 5G modem/ receiver, and vehicle-to-vehicle (V2V) communication system	• Demonstrate the process of checking various components of the drone, such as chassis, propellers, compass, camera, wiring, landing gear, for damage and defects.
• Explain the importance of following the maintenance schedule recommended by the drone manufacturer.	• Demonstrate how to repair or replace the defective or damaged components, using the manufacturer-approved spare parts, and maintenance tools and equipment.
• Explain the importance and process of maintaining the record of repair and maintenance activities manually and electronically.	• Prepare a sample record of repair and maintenance activities and review the maintenance records to identify and address recurring issues.

Classroom Aids

Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop

Tools, Equipment and Other Requirements

Drone, Propellers, Compass, Camera, and Laptop/Desktop with pre- Installed software like Vehicle-to-Vehicle (V2V) Communication Software, Traffic Management Software.

Module 4: Process of organising work and resources as per health and Safety standards

Mapped to NOS TEL/N9101 v1.0

Terminal Outcomes:

- Explain the importance of performing work as per quality standards.
- Explain the importance of maintaining a safe, healthy and secure working environment.
- Explain the importance of conserving material/energy/electricity.
- Describe the process of using effective waste management/recycling practices.

Duration: 16:00	Duration: 24:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Explain various strategies pertinent to their field (such as internet searches, asking peers and managers, enrolling for courses and certifications, etc.) that can be used to pursue advancement in their skills. - State key performance indicators for the new tasks. - Describe feedback processes and formats. - Explain timelines and goals as well as their relevance to work allocated. - Explain the importance of quality and timely delivery of the product/service. - Explain the escalation matrix and its importance, especially in case of emergencies. - Explain various ways of time and cost management. - State the rules/regulations for maintaining health and safety at the workplace. - Explain the meaning of hazard, different types of health and safety hazards found in the workplace, risks and threats based on the nature of work. - Explain the relevant signage, warnings, labels or descriptions on equipment, etc. while carrying out	- Demonstrate how to record/document tasks completed as per the requirements within specific timelines. - Show how to analyse problems accurately and communicate different possible solutions to the problem. - Demonstrate how to report any identified breaches in health, safety, and security policies and procedures to the designated person. - Demonstrate the process of using safety materials such as goggles, gloves, earplugs, caps, ESD pins, covers, shoes, etc. - Demonstrate the process of handling heavy and hazardous materials with care, while maintaining appropriate posture. - Demonstrate the process of carrying out routine cleaning of tools, machines and equipment. - Demonstrate ways to optimise the use of electricity/energy in various tasks/activities/processes. - Demonstrate the process of performing periodic checks of the functioning of the equipment/machine and rectify wherever required. - Demonstrate ways to use electrical

- work activities.

- Describe the procedures to report breaches in health, safety and security.

- Describe the organisation's procedures for different emergency situations and the importance of following the same.

- Describe different methods of cleaning, disinfection, sterilisation, and sanitisation.

- Explain the significance of personal hygiene practice including hand hygiene.

- Explain the path of disease transmission.

- Describe the correct method of donning and doffing of PPE.

- Explain different ways of managing resources and material efficiently.

- Explain common electrical problems and common practices of conserving electricity.

- Explain categorisation of waste into dry, wet, recyclable, non-recyclable and items of single-use plastics and use of different colours of dustbins.

- Describe the organisation's procedures for minimising waste.

- Explain waste management and methods of waste disposal.

- State common sources of pollution and ways to minimise it.

- equipment and appliances properly

- Demonstrate the process of disposing non-recyclable and hazardous waste as per recommended processes.

Classroom Aids:
Training Kit (Trainer **G**uide, Presentations). Whiteboard, Marker, Projector, Laptop

Tools, Equipment and Other Requirements
Relevant stationery, First Aid Kit and Equipment used in Medical Emergencies.

Module 5: Process of interacting effectively with team members and customers
Mapped to TEL/N9102 v1.0

Terminal Outcomes:

- Explain the importance of interacting effectively with superiors, colleagues and customers.
- Explain the need of respecting differences of gender and ability.

Duration: 16:00	Duration: 24:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Explain the organisation's policies on dress code, workplace timings, workplace behaviour, performance management, incentives, delivery standards, information security, etc. - Explain the organisation's hierarchy and escalation matrix - Explain the importance of effective and different means of communication and establishing good working relationships with colleagues and superiors. - Explain the importance of helping colleagues with problems, in order to meet quality and time standards as a team. - Describe different means and methods of communication. - State different types of information that colleagues might need and the importance of providing this information in an appropriate manner. - Describe the organization's policies and procedures for working with colleagues and superiors. - Explain the importance of understanding the consequences of gender based behaviour. - Describe gender based concepts, issues and legislation - State the organization standards and guidelines to be followed for PwD and knowledge about laws, acts and provisions defined for PwD by the	- Demonstrate ways to communicate professionally using different techniques such as face-to-face, telephonic and written means. - Demonstrate appropriate verbal and non-verbal communication while interacting with People with Disability (PwD).

statutory bodies and the right way to use them including various medical conditions associated with PwD	
• Explain the health and safety requirements at a workplace for PwD.	
• Describe the process of recruiting people for a particular job profile w.r.t PwD and gender.	
• Explain various government / private schemes and benefits available for PwD and information about various institutes working for PwD to enable in providing livelihood opportunities for PwD.	

Classroom Aids

Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop

Tools, Equipment and Other Requirements

Personal Protective Equipment, Hygiene Equipment and Materials like Sanitizer, Soap, Mask, etc.

Module 6: On-the-Job Training

Mapped to Drone Monitoring and Maintenance Associate (TEL/Q6217 v1.0)

Mandatory Duration: 120:00	Recommended Duration: 00:00

Location: On-Site

Terminal Outcomes

1. Explain the process of data transmission from a 5G enabled drone.

2. Conduct the relevant tests to ensure data uplink, and downlink take place without any issues over the 5G network.

3. Create high-accuracy maps and 3D models through data analysis.

4. Carry out troubleshooting for any issues identified with the drone during testing, following the manufacturer's instructions.

5. Use the 5G network connectivity for autonomous drone activity such as precision monitoring and mapping, according to the capability of the drone.

6. Use the 5G network connectivity to operate the drone out of the Visual Line of Sight (VLOS), monitoring its path to avoid collision with other drones or Unmanned Aerial Vehicles (UAVs).

7. Repair or replace the defective or damaged components, using the manufacturer-approved spare parts, and maintenance tools and equipment.

8. Record repair and maintenance activities and review the maintenance records to identify and address recurring issues.

9. Handle heavy and hazardous materials with care, while maintaining appropriate posture.

10. Dispose non-recyclable and hazardous waste as per recommended processes.

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	*Specialization*	*Years*	*Specialization*	
Diploma after 10th Class	Science/Electronics/Telecom/IT and other related domains	4	Active Networks/Drone Domain	0	NA	Eligible for ToT program
Graduate	Science/Electronics/Telecom/IT and other relevant domains	1	Active Networks/Drone Domain	0	NA	Eligible for ToT program

Trainer Certification	
Domain Certification	**Platform Certification**
Job Role "**Drone Monitoring and Maintenance Associate**", "TEL/Q6217, v1.0", Minimum accepted score is 80%	Job Role: "**Trainer**", "MEP/Q2601, v1.0". Minimum accepted score is 80%.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	*Specialization*	*Years*	*Specialization*	
Diploma after 10th Class	Science/Electronics /Telecom/IT and other related domains	4	Active Networks/IoT Domain	0	NA	Eligible for ToA program
Graduate	Science/Electronics /Telecom/IT and other relevant domains	1	Active Networks/IoT Domain	0	NA	Eligible for ToA program

Assessor Certification	
Domain Certification	**Platform Certification**
Job Role "**Drone Monitoring and Maintenance Associate**", "TEL/Q6217, v1.0", Minimum accepted score is 80%	Job Role: "**Assessor**", "MEP/Q2701 v1.0", Minimum Accepted score is 80%

Assessment Strategy

1. Assessment System Overview:
- Batches assigned to the assessment agencies for conducting the assessment on SDSM/SIP or email.
- Assessment agencies send the assessment confirmation to VTP/TC looping SSC.
- The assessment agency deploys the ToA certified Assessor for executing the assessment.
- SSC monitors the assessment process & records.

2. Testing Environment:
- Confirm that the centre is available at the same address as mentioned on SDMS or SIP.
- Check the duration of the training.
- Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
- If the batch size is more than 30, then there should be 2 Assessors.
- Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
- Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
- Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
- Check the availability of the Lab Equipment for the particular Job Role.

3. Assessment Quality Assurance levels / Framework:
- Question papers created by the Subject Matter Experts (SME).
- Question papers created by the SME verified by the other subject Matter Experts.
- Questions are mapped with NOS and PC.
- Question papers are prepared considering that level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management.
- An assessor must be ToA certified & the trainer must be ToT Certified.
- The assessment agency must follow the assessment guidelines to conduct the assessment.

4. Types of evidence or evidence-gathering protocol:
- Time-stamped & geotagged reporting of the assessor from assessment location.
- Center photographs with signboards and scheme-specific branding.
- Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period.
- Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos.

5. Method of verification or validation:
- A surprise visit to the assessment location.
- A random audit of the batch.
- Random audit of any candidate.

6. Method for assessment documentation, archiving, and access:
- Hard copies of the documents are stored.
- Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage.
- Soft copies of the documents & photographs of the assessment are stored in the Hard Drives.

References

Glossary

Term	Description
Declarative Knowledge	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
Key Learning Outcome	A key learning outcome is a statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT (M)	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on-site
OJT (R)	On-the-job training (Recommended); trainees are recommended the specified hours of training on-site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work or produce a tangible work output by applying cognitive, affective or psychomotor skills.
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do upon the completion of the training.
Terminal Outcome	The terminal outcome is a statement of what a learner will know, understand and be able to do upon the completion of a module. A set of terminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

Term	Description
NOS	National Occupational Standard (s)
NSQF	National Skills Qualifications Framework
OJT	On-the-job Training
QP	Qualifications Pack
PwD	People with Disability
PPE	Personal Protective Equipment