Model Curriculum

QP Name: Radio Frequency Engineer – Drone-Based Surveys

QP Code: TEL/Q6226

Version: 1.0

NSQF Level: 5.5

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

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Training Parameters

Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Network Operation and Maintenance
Country	India
NSQF Level	5.5
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2153.0200
Minimum Educational Qualification and Experience	Completed 3rd year of 3-year/4-years UG** with No Experience required Or Completed 2nd year diploma* after 12 with 1.5 years relevant experience*** Or Previous relevant Qualification of NSQF Level 5 with 1.5 years relevant experience*** Or Previous relevant Qualification of NSQF Level 4.5 with 3 years relevant experience*** **Diploma in Electronics, Telecommunications, IT, Computer Science, Mechatronics, or related fields.* *** UG: Engineering/Technology (preferably in Telecom, Electronics, IT, Computer Science or UAV-related fields).* ****Relevant experience in Drone operations, Telecom deployment, UAV-based infrastructure inspection or other relevant domains.* *The relevant experience would include work, internship, or apprenticeship after completing relevant educational qualifications.*
Pre-Requisite License or Training	NA
Minimum Job Entry Age	NA
Last Reviewed On	24-12-2025
Next Review Date	24-12-2028
NSQC Approval Date	06-02-2026
QP Version	1.0

Model Curriculum Creation Date	24-12-2025
Model Curriculum Valid Up to Date	24-12-2028
Model Curriculum Version	1.0
Minimum Duration of the Course	570 Hours
Maximum Duration of the Course	570 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:

- Analyse RF signal strength data collected through drone-based surveys to identify signal patterns, anomalies, and areas requiring optimisation.
- Identify and evaluate sources of signal interference and dead zones by using spectrum analysis, frequency scanning tools, and GIS-based mapping techniques.
- Assess 4G/5G/LTE network performance by locating blind spots and interference zones using drone-assisted RF measurements and comparing them with theoretical models.
- Support 5G rollout planning by conducting drone-based RF surveys, coordinating with drone operators, and providing data-driven insights to network engineers.
- Ensure health, safety, and environmental compliance during drone-based operations by adhering to telecom regulations, risk mitigation protocols, and eco-friendly practices.

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
TEL/Q6293: Analyse RF Signal Strength Data from Drone-Based Surveys **NOS Version-1.0** **NSQF Level- 5.5**	**30:00**	**40:00**	**50:00**	**-**	**120:00**
Module 1: Introduction to the role of RF Engineer – Drone Based Survey	10:00	-	-	-	10:00
Module 2: Analyse RF Signal Strength Data from Drone-Based Surveys	20:00	40:00	50:00	-	110:00
TEL/Q6294: Identify Signal Interference and Dead Zones **NOS Version-1.0** **NSQF Level- 5.5**	**10:00**	**20:00**	**30:00**	**-**	**60:00**
Module 3: Identify Signal Interference and Dead Zones	10:00	20:00	30:00	-	60:00

TEL/Q6295: Identify Interference and Blind Spots for 5G/4G/LTE Networks **NOS Version-1.0** **NSQF Level- 5.5**	**10:00**	**40:00**	**40:00**	**-**	**90:00**
Module 4: Identify Interference and Blind Spots for 5G/4G/LTE Networks	10:00	40:00	40:00	-	90:00
TEL/Q6296: Support 5G Rollout Planning with Drone-Based Data Collection **NOS Version-1.0** **NSQF Level- 5.5**	**20:00**	**30:00**	**40:00**	**-**	**90:00**
Module 5: Support 5G Rollout Planning with Drone-Based Data Collection	20:00	30:00	40:00	-	90:00
TEL/Q6297: Optimise Antenna Alignments for Better Network Coverage NOS Version-1.0 **NSQF Level- 5**.5	**10:00**	**40:00**	**40:00**	**-**	**90:00**
Module 6: Optimise Antenna Alignments for Better Network Coverage	10:00	40:00	40:00	-	90:00
TEL/Q6298: Ensure Health, Safety, and Environmental Compliance in Drone Operations **NOS Version-1.0** **NSQF Level- 5.5**	**10:00**	**10:00**	**10:00**	**-**	**30:00**
Module 7: Ensure Health, Safety, and Environmental Compliance in Drone Operations	10:00	10:00	10:00	-	30:00
DGT/VSQ/N0103: Employability Skills (90 Hours) **NOS Version No. 1** **NSQF Level- 5.5**	**90:00**	**-**	**-**	**-**	**90:00**
Module 8: Employability Skills (90 hours)	90:00	-	-	-	60:00
Total Duration	**180:00**	**180:00**	**210:00**	**-**	**570:00**

Module Details

Module 1: Introduction to the role of RF Engineer – Drone Based Survey

Mapped to NOS: TEL/N6293, v1.0

Terminal Outcomes:

- Discuss the job role of RF Engineer – Drone Based Survey.
- Explain the scope of work for RF Engineer – Drone Based Survey.

Duration: 10:00	**Duration: 00:00**
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 RF Engineer – Drone Based Survey. • Identify various employment opportunities for a RF Engineer – Drone Based Survey. • Discuss the organizational 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 RF Engineer – Drone Based Survey. • List the various daily, weekly, monthly operations/activities that take place at the site under RF Engineer – Drone Based Survey.	
Classroom Aids	
Training Kit (Trainer Guide, Presentations), Whiteboard, Markers, Notebooks, Pens, Laptop/Computer with an Internet connection, Speakers, Projector or Large screen.	
Tools, Equipment and Other Requirements	
NA	

Module 2: Analyse RF Signal Strength Data from Drone-Based Surveys

Mapped to NOS: TEL/N6293, v1.0

Terminal Outcomes:

- Evaluate the purpose, parameters, and environmental considerations for planning and conducting drone-based RF signal strength surveys.
- Apply appropriate tools, drone configurations, and frequency measurement techniques to collect accurate RF signal data in real-world scenarios.
- Analyze extracted RF signal data to identify patterns, anomalies, coverage strengths, and network performance gaps using industry-standard methodologies.
- Create detailed survey reports, visual heatmaps, and technical recommendations for network optimisation based on RF data analysis findings.

Duration: 20:00	**Duration: 40:00**
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the purpose and applications of RF signal strength surveys, such as interference detection and signal optimisation. • Describe the fundamentals of RF signal propagation, including reflection, absorption, and attenuation. • Interpret key RF signal strength metrics such as RSSI, SINR, and SNR. • Recognise the transmission characteristics of various frequency bands including 4G, 5G, and LTE. • Describe how environmental elements like buildings, trees, and terrain affect signal quality. • Explain the concept of RF bandwidth and its impact on data throughput and camera feedback. • Identify common sources of RF interference such as Wi-Fi networks and industrial devices. • Discuss the importance of planning drone flight paths with line-of-sight and altitude considerations. • Explain the differences between omni, directional, and patch antennas and their	• Demonstrate how to determine the objective and scope of an RF signal survey. • Plan a drone-based RF survey, including coverage area, altitude, and resolution requirements. • Review and interpret pre-survey documents, including network layout and expected signal benchmarks. • Configure the appropriate drone and ensure it is compatible with RF measurement tools. • Set up and calibrate the RF ground control system, including modems, laptops, and RAC components. • Use GIS and mapping tools to define and visualise the survey path and coverage area. • Conduct pre-flight planning using tools like Google Earth Pro to simulate and validate survey routes. • Apply altitude and terrain-based adjustments for optimal signal acquisition. • Perform data extraction from drone-based RF measuring equipment. • Validate the extracted RF data, checking for timestamp, location, and metadata consistency.

respective uses. • Describe the functioning of antenna tracking systems and their role in signal capture. • Outline the principles and configurations of mesh and point-to-point radio systems. • Summarise the steps involved in interference scanning and frequency hopping using smart radios. • Explain the use of GIS and mapping tools in RF survey planning and data visualisation. • Interpret frequency spectrum data and correlate it with known network behaviours. • Describe best practices for maintaining RF survey records and analysis archives. • Explain the role of historical performance data in validating current survey outcomes. • Discuss common causes of glitches or latency in video feedback during drone operation. • Assess mesh and point-to-point radio systems for handling multiple data feeds efficiently.	• Clean the dataset by removing noise, duplicates, and outliers. • Normalise RF signal data to align with industry standards and benchmarking tools. • Generate visual RF signal plots and identify trends or anomalies. • Compare signal values with network design expectations to detect mismatches. • Display signal variations across altitude layers and physical locations. • Highlight weak signal areas, coverage gaps, and unexpected interference zones. • Apply the correct antenna types for directional and omni-directional signal capture. • Show how to pair drone RF modems with ground modems for antenna tracking and signal precision. • Measure RF bandwidth performance and assess its compatibility with drone video/data throughput. • Perform signal integrity tests, including SNR and RSS evaluations. • Generate RF heatmaps using appropriate software tools. • Compose a categorised report based on signal strength levels (strong, moderate, weak, dead zones). • Propose network enhancement recommendations based on the analysis findings. • Conduct interference scans using frequency scanners and smart radios.
Classroom Aids:	
Training Kit (Trainer Guide, Presentations), Whiteboard, Markers, Notebooks, Pens, Laptop/Computer with an Internet connection, Speakers, Projector or Large screen.	
Tools, Equipment and Other Requirements	
Drone (RF-compatible), Ground Control Station (GCS), RF Signal Measurement Tools, Laptops with Data Analysis Software, GIS Mapping Software (e.g., QGIS, ArcGIS), Google Earth Pro, RF Spectrum Analyzer, Smart Radio and Frequency Scanner, Yagi Antenna, Patch Antenna, Omni Antenna, Antenna Tracking System, Mesh Radio System Kit, Point-to-Point Radio Units, Flight Planning Software, Signal Visualisation Tools (e.g., RF heatmap generators), SNR/RSS Measurement Devices, Network Topology Diagrams, Simulated Network Environment (for indoor practice), High-Speed Internet Connection,	

Whiteboard and Markers, Projector and Screen, Classroom Furniture (tables, chairs), Power Backup Equipment (UPS), Safety Gear (helmets, vests, etc. for field training), First Aid Kit.

Module 3: Identify Signal Interference and Dead Zones

Mapped to NOS: TEL/N6294, v1.0

Terminal Outcomes:

- Describe drone flight controller platforms and their software ecosystems
- Analyze RF spectrum data to detect signal interference patterns and anomalies across different environmental conditions.
- Classify types of RF interference and assess their impact on network performance using industry-standard tools and techniques.
- Evaluate network coverage maps to identify dead zones and correlate them with environmental and structural factors.
- Propose effective mitigation strategies for interference and dead zones, supported by data analysis and technical reasoning.

Duration: 10:00	**Duration: 20:00**
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the fundamentals of embedded systems and microcontrollers, including architectures, peripherals, and communication protocols like I2C, UART, and SPI, as applied in drones. • Describe various drone flight control software platforms such as Betaflight, ArduPilot, and PX4. • Illustrate the principles of sensor integration and calibration techniques for drone systems, covering IMU, GPS, barometer, and ESC calibration processes, and the role of basic programming in tuning them. • Explain the principles of RF signal propagation and how environmental factors affect signal performance. • Describe different types of RF interference such as co-channel, adjacent-channel, and multipath interference. • Discuss the impact of interference on signal quality, coverage, and user experience in telecom networks. • Identify tools and technologies used in RF spectrum analysis and interference detection.	• Demonstrate installation and configuration of flight control software (e.g., PX4, Betaflight) and integrate it with drone hardware components including ESCs, sensors, and RC modules. • Develop and test embedded code to interface sensors and actuators using microcontrollers (e.g., Arduino, STM32), including sensor data logging and basic motor control routines. • Use debugging tools and logs to troubleshoot embedded system errors and analyze flight data to adjust parameters for optimal system response and flight performance. • Demonstrate how to examine RF frequency bands for unexpected anomalies using spectrum analysis tools. • Use RF signal analysis tools to detect patterns of signal degradation at various altitudes and locations. • Conduct environmental impact analysis on RF signal performance due to terrain, weather, or obstructions. • Compare real-time interference data with design parameters and historical benchmarks. • Apply frequency scanning tools to identify

- Explain how terrain, weather, buildings, and obstructions influence RF signal degradation.
- Describe methods for detecting and classifying transient vs. persistent interference.
- Discuss the contribution of mesh radio systems in maintaining signal integrity under interference.
- Illustrate the use of geospatial and GIS tools in mapping network coverage and dead zones.
- Discuss techniques for correlating signal loss with topographical and man-made features.
- Discuss the feasibility of reconfiguring the network layout to minimise coverage gaps.
- Compare network coverage models with real-time data to detect deviations and blind spots.
- Explain network optimisation strategies to resolve interference and dead zone issues.
- Illuminate on the corrective measures like antenna reorientation, power boosting, or frequency adjustments.
- Identify appropriate technical interventions such as power tuning, antenna realignment, and frequency reallocation.

and characterise sources of signal interference.

- Assess the effectiveness of smart radio frequency hopping in interference mitigation.
- Identify and classify interference types, such as co-channel and adjacent-channel, using detection tools.
- Detect transient interference incidents caused by mobile or external elements like vehicles or construction.
- Cross-check interference patterns with data from Wi-Fi networks, microwave systems, and industrial sources.
- Determine the persistence and localisation of interference sources in different network areas.
- Extract and interpret RF signal strength data to identify areas with weak or no coverage.
- Use GIS software to generate visual maps of dead zones and signal gaps.
- Correlate coverage issues with topographical features and physical barriers.
- Compare mapped dead zones with expected network performance models.
- Determine causes of dead zones, such as network congestion, physical obstructions, or interference.
- Show how to compose technical reports that document interference analysis and dead zone mapping results.
- Collaborate with network teams and telecom engineers to propose and review mitigation strategies.
- Maintain and update interference logs and coverage maps for ongoing analysis and optimisation.

Classroom Aids:

Training Kit (Trainer Guide, Presentations), Whiteboard, Markers, Notebooks, Pens, Laptop/Computer with an Internet connection, Speakers, Projector or Large screen.

Tools, Equipment and Other Requirements

RF Spectrum Analyzer, Frequency Scanner, Smart Radio with Frequency Hopping Capability, GIS Mapping Software (e.g., QGIS, ArcGIS), Laptops with RF Analysis Software, Signal Visualisation Tools, Directional Antennas (Yagi, Patch), Omni Antennas, Mesh Radio System Kit, Point-to-Point Radio Units, Terrain and Topography Maps, Drone with RF Measurement Capability (optional), Network Design

Diagrams and Coverage Models, High-Speed Internet Connection, Projector and Screen, Whiteboard and Markers, Training Manual and Handouts, Power Backup Equipment (UPS), First Aid Kit.

Module 4: Identify Interference and Blind Spots for 5G/4G/LTE Networks

Mapped to NOS: TEL/N6295, v1.0

Terminal Outcomes:

- Conduct drone-based RF surveys to capture and validate signal strength and interference data for 5G/4G/LTE networks.
- Analyze RF data to detect signal inconsistencies, coverage gaps, and interference patterns across surveyed areas.
- Classify sources of interference and map blind spots using geospatial tools and RF analysis software.
- Recommend network optimisation measures by documenting findings and collaborating with planning and technical teams.

Duration: 10:00	**Duration: 40:00**
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the fundamentals of RF signal strength and its relevance to 5G/4G/LTE network performance. • Describe common sources of RF interference, including adjacent-channel, co-channel, and external sources. • Discuss how environmental factors such as terrain, weather, and urban infrastructure affect RF signal quality. • Identify the frequency bands used for 5G/4G/LTE and their characteristics. • Discuss the significance of blind spots in network coverage and their implications for end-user experience. • Identify external interference sources such as industrial equipment, Wi-Fi hotspots, and unauthorised signals. • Explain how network congestion and infrastructure limitations can contribute to degraded signal quality. • Discuss the tools and software used for RF analysis and visualisation in telecom surveys. • Illustrate the process of comparing RF analysis results with telecom coverage maps to identify gaps in network delivery. • Explain how to categorise interference sources based on signal characteristics and	• Conduct drone-based RF surveys to gather signal strength and interference data over target areas. • Retrieve and verify RF data collected from drones to ensure completeness and integrity. • Apply procedures to check frequency band coverage for 5G/4G/LTE networks during drone surveys. • Compare real-time drone data with expected signal benchmarks to identify discrepancies. • Detect inconsistencies in network coverage caused by interference or obstacles. • Map RF blind spots by analysing signal attenuation across surveyed zones. • Use RF analysis software to process drone-collected data and generate signal strength plots. • Identify interference patterns and match them with known types (adjacent-channel, co-channel). • Correlate interference findings with environmental and structural factors using GIS data. • Evaluate the impact of network congestion on signal quality using RF performance

temporal behaviour. • Illustrate the process of comparing drone-collected RF data with existing network coverage maps. • Illuminate on the importance of accurate documentation and reporting for interference management and network optimisation.	indicators. • Generate location-specific interference logs with geospatial coordinates for technical teams. • Propose actionable recommendations for mitigation based on data analysis. • Collaborate with optimisation teams to align findings with future network improvement plans.

Classroom Aids
Training Kit (Trainer Guide, Presentations), Whiteboard, Markers, Notebooks, Pens, Laptop/Computer with an Internet connection, Speakers, Projector or Large screen.
Tools, Equipment and Other Requirements
Drones with RF measurement payload, Ground Control Station, RF Spectrum Analyzer, RF Interference Scanner, Smart Radio with Frequency Hopping Capability, GPS-enabled Data Logger, Omni Antenna, Yagi Antenna, Patch Antenna, 5G/4G/LTE Network Simulators, Laptop with RF Analysis Software, Telecom Coverage Maps, GIS and Mapping Software, Network Congestion Monitoring Tools, Signal Strength Visualization Tools, Environmental Simulation Models, Documentation Templates, etc.

Module 5: Support 5G Rollout Planning with Drone-Based Data Collection

Mapped to NOS: TEL/N6296, v1.0

Terminal Outcomes:

- Plan drone-based RF data collection strategies to support effective 5G rollout in targeted geographic areas.
- Analyse RF signal strength and propagation data to evaluate 5G network readiness and performance.
- Identify network coverage gaps and signal propagation challenges based on drone-surveyed RF data.
- Recommend optimisation strategies for 5G infrastructure deployment using insights from collected and analysed data.

Duration: 20:00	**Duration: 30:00**
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the fundamentals of 5G network architecture, including frequency bands and signal propagation behaviour. • Describe the role of small cells, repeaters, and beamforming in 5G network deployment. • Identify the key objectives and applications of RF data collection using drones in the context of 5G rollout. • Identify patterns of signal propagation and areas of signal attenuation across various terrains. • Discuss the parameters and tools used for RF signal measurement and network evaluation. • Illustrate the impact of urban infrastructure, terrain, and environmental factors (e.g., vegetation, buildings) on 5G signal performance. • Explain signal propagation characteristics across different environments—urban, suburban, and rural. • Describe common interference sources and their effects on 5G signal coverage	• Plan drone-based RF data collection by identifying key geographical areas for signal measurement. • Collaborate with drone operators to optimise flight paths for comprehensive RF data acquisition. • Verify RF measurement equipment for accuracy and calibration prior to deployment. • Conduct RF signal strength measurements using drone-mounted equipment in different environments. • Process and analyse collected RF data to evaluate 5G network performance metrics. • Detect potential sources of interference affecting 5G signal coverage. • Compare RF data with theoretical 5G network models to validate deployment strategies. • Use data visualisation tools to create signal strength heatmaps and coverage overlays. • Evaluate the effect of buildings, terrain,

and quality. • Identify network gaps and performance challenges due to physical obstructions or propagation issues. • Outline the strategies for network densification to enhance 5G coverage and capacity. • Explain the significance of comparing RF measurement data with network models to validate assumptions. • Summarize documentation practices and reporting standards used for 5G rollout analysis.	and foliage on signal reliability and strength. • Document survey findings and highlight coverage issues relevant to network planners and engineers. • Propose optimal antenna placement and network configuration adjustments for better coverage. • Recommend infrastructure enhancements like small cells or repeaters based on data insights. • Maintain detailed and structured records of all RF data collection activities and outcomes for future planning.

Classroom Aids

Training Kit (Trainer Guide, Presentations), Whiteboard, Markers, Notebooks, Pens, Laptop/Computer with an Internet connection, Speakers, Projector or Large screen.

Tools, Equipment and Other Requirements

Drone with RF sensors, 5G RF spectrum analyser, Data visualisation software (e.g., QGIS, Tableau), RF signal processing software, Drone flight planning software, Laptop or workstation, GIS mapping tools, Calibration tools for RF equipment, Training manuals and reference guides, Projector and screen, Internet connectivity, Sample 5G network models and maps, Safety equipment (vests, goggles, gloves), Power backup system, GPS device, Mock urban/rural environment models, Sample interference data sets, Antenna setup kit.

Module 6: Optimise Antenna Alignments for Better Network Coverage

Mapped to NOS: TEL/N6297, v1.0

Terminal Outcomes:

- Plan and coordinate drone-based RF data collection activities to assess antenna signal performance in real-time environments.
- Analyze RF data to identify antenna misalignments, interference issues, and signal coverage gaps using specialised tools.
- Recommend precise adjustments to antenna tilt, azimuth, and placement to enhance network coverage and signal strength.
- Validate the effectiveness of antenna optimisation efforts through comparative post-alignment RF surveys and data analysis.

Duration: 10:00	**Duration: 40:00**
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the role of RF data in antenna alignment and network optimisation. • Describe the process of drone-based RF data collection, including key pre-deployment checks. • Identify the factors that influence antenna performance, including tilt, azimuth, and height. • Recognise common causes of weak signal strength and coverage gaps in telecom networks. • Discuss methods to interpret RF signal metrics such as RSSI and SINR in relation to antenna positioning. • Explain environmental and geographical influences on antenna effectiveness and signal propagation. • Explain the importance of comparing pre- and post-alignment RF data for performance validation. • Describe compliance and safety considerations during antenna adjustment and optimisation processes.	• Plan drone-based RF survey operations by selecting key measurement points near antenna locations. • Coordinate with drone operators to ensure proper flight paths and accurate data collection protocols. • Verify calibration of RF sensors mounted on drones prior to survey deployment. • Conduct drone-assisted RF data collection to capture real-time signal strength and coverage patterns. • Use RF analysis software to identify signal inconsistencies and coverage blind spots. • Analyse RF data to detect antenna misalignments and sources of weak signal strength. • Correlate RF measurement results with topographical maps and site-specific environmental features. • Propose antenna tilt and azimuth adjustments based on analysed data trends. • Recommend new antenna placements to minimise signal obstructions and maximise reach.

	• Role-play to collaborate with network engineers to align drone data insights with technical network plans. • Apply adjustments to antenna orientation and positioning under supervised conditions. • Conduct post-adjustment RF surveys using drones to validate antenna alignment changes. • Compare pre- and post-alignment signal coverage maps to assess network improvements. • Generate performance improvement reports based on data visualisation and coverage enhancement evidence.
Classroom Aids	
Training Kit (Trainer Guide, Presentations), Whiteboard, Markers, Notebooks, Pens, Laptop/Computer with an Internet connection, Speakers, Projector or Large screen	
Tools, Equipment and Other Requirements	
Drone with RF Sensor Payload, Calibrated RF Measurement Tools, RF Analysis Software (e.g., TEMS, NEMO), Spectrum Analyzer, GIS Mapping Software (e.g., ArcGIS, QGIS), Antenna Alignment Toolkits, Laptop with Network Planning Software, Pre- and Post-Survey Templates and Maps, Digital Compass and Inclinometer, Signal Strength Visualisation Tools, High-Resolution Aerial Imagery, Protective Equipment (Helmet, Gloves, Vest), Field Communication Devices (e.g., Walkie-Talkies), Projector and Screen for Training, Whiteboard and Markers, Training Handouts and Manuals, High-Speed Internet Connection, Power Backup System (UPS), First Aid Kit.	

Module 7: Ensure Health, Safety, and Environmental Compliance in Drone Operations

Mapped to NOS: TEL/N6298, v1.0

Terminal Outcomes:

- Demonstrate compliance with safety regulations and airspace permissions required for conducting drone-based RF surveys.
- Implement effective safety protocols and equipment handling procedures to prevent operational hazards during drone deployment.
- Assess environmental impact factors and apply eco-friendly practices to minimise the ecological footprint of drone operations.
- Develop comprehensive risk mitigation and emergency response plans to manage incidents and ensure safe survey execution.

Duration: 10:00	**Duration: 10:00**
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the importance of adhering to drone operation regulations laid out by government and telecom industry bodies. • Describe the standard procedures for airspace permissions and safe drone flight zones. • Illustrate the significance of pre-operation safety checks and proper equipment handling. • Discuss the types and correct usage of Personal Protective Equipment (PPE) for drone-based fieldwork. • Outline industry protocols for health and safety compliance during RF survey operations. • Identify environmental factors like noise, wildlife disturbance, and battery disposal that must be considered during drone deployment. • Explain the importance of following sustainable practices during drone operations. • Explain risk management strategies, including hazard identification and emergency response planning.	• Demonstrate compliance with relevant government and industry regulations for drone operations during RF surveys. • Verify that drone flight permissions and airspace approvals are in place before deployment. • Conduct pre-flight safety checks to detect environmental, technical, and operational hazards. • Perform safe handling, loading, and unloading of RF survey and drone equipment. • Apply telecom safety protocols while coordinating with drone operators and technical teams. • Assess noise levels, local wildlife activity, and proximity to sensitive ecosystems before flying. • Monitor survey locations for conditions (like weather or terrain) that might distort RF data accuracy. • Promote the correct disposal and recycling of drone batteries and electronic parts. • Plan emergency procedures for

	situations such as drone malfunction, crash, or communication failure. ● Develop a site-specific risk mitigation strategy covering flight zone hazards and access control. ● Role-play emergency response drills including communication with team and authorities. ● Report safety incidents or near-miss events using standard formats. ● Document regulatory compliance checks, environmental observations, and safety audits.
Classroom Aids	
Training Kit (Trainer Guide, Presentations), Whiteboard, Markers, Notebooks, Pens, Laptop/Computer with an Internet connection, Speakers, Projector or Large screen	
Tools, Equipment and Other Requirements	
Drone with RF measurement sensors, Ground Control Station, Personal Protective Equipment (PPE), First-aid kit, Environmental monitoring tools, Weather monitoring system, Battery disposal containers, Emergency response plan templates, Regulatory compliance checklists, Training manual on airspace rules, RF equipment storage cases, Fire extinguisher, Logbook for incident reporting, Maps of restricted and permitted airspace, Noise level meter, Laptop with RF data analysis software, Waste disposal bins (for e-waste), Instructional videos on drone safety, Presentation slides on environmental best practices, Mock emergency drill kit.	

Module 7: DGT/VSQ/N0103: Employability Skills (90 Hours)

Mandatory Duration: 90:00			
Location: On-Site			
S.No.	**Module Name**	**Key Learning Outcomes**	**Duration (hours)**
1.	Introduction to Employability Skills	• Outline the importance of Employability Skills for the current job market and future of work • List different learning and employability related GOI and private portals and their usage • Research and prepare a note on different industries, trends, required skills and the available opportunities	3 Hours
2.	Constitutional values - Citizenship	• Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen • Demonstrate how to practice different environmentally sustainable practices	1.5 Hours
3.	Becoming a Professional in the 21st Century	• Discuss relevant 21st century skills required for employment • Highlight the importance of practicing 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life • Create a pathway for adopting a continuous learning mindset for personal and professional development	5 Hours
4.	Basic English Skills	• Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone • Read and understand text written in basic English • Write a short note/paragraph / letter/e -mail using correct basic English	10 Hours
5.	Career Development & Goal Setting	• Create a career development plan • Identify well-defined short- and long-term goals	4 Hours
6.	Communication Skills	• Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette • Write a brief note/paragraph on a familiar topic	10 Hours

		• Explain the importance of communication etiquette including active listening for effective communication • Role play a situation on how to work collaboratively with others in a team	
7.	Diversity & Inclusion	• Demonstrate how to behave, communicate, and conduct appropriately with all genders and PwD • Discuss the significance of escalating sexual harassment issues as per POSH act	2.5 Hours
8.	Financial and Legal Literacy	• Discuss various financial institutions, products, and services • Demonstrate how to conduct offline and online financial transactions, safely and securely and check passbook/statement • Explain the common components of salary such as Basic, PF, Allowances (HRA, TA, DA, etc.), tax deductions • Calculate income and expenditure for budgeting • Discuss the legal rights, laws, and aids	10 Hours
9.	Essential Digital Skills	• Describe the role of digital technology in day-to-day life and the workplace • Demonstrate how to operate digital devices and use the associated applications and features, safely and securely • Demonstrate how to connect devices securely to internet using different means • Follow the dos and don'ts of cyber security to protect against cyber crimes • Discuss the significance of displaying responsible online behavior while using various social media platforms • Create an e-mail id and follow e- mail etiquette to exchange e –mails • Show how to create documents, spreadsheets and presentations using appropriate applications • Utilize virtual collaboration tools to work effectively	20 Hours
10.	Entrepreneurship	• Explain the types of entrepreneurship and enterprises • Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan • Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement • Create a sample business plan, for the selected business opportunity	7 Hours

11.	Customer Service	• Classify different types of customers • Demonstrate how to identify customer needs and respond to them in a professional manner • Discuss various tools used to collect customer feedback • Discuss the significance of maintaining hygiene and dressing appropriately	9 Hours
12.	Getting ready for apprenticeship & Job	• Draft a professional Curriculum Vitae (CV) • Use various offline and online job search sources to find and apply for jobs • Discuss the significance of maintaining hygiene and dressing appropriately for an interview • Role play a mock interview • List the steps for searching and registering for apprenticeship opportunities	8 Hours

LIST OF TOOLS & EQUIPMENT FOR EMPLOYABILITY SKILLS		
Sl No.	**Name of the Equipment**	**Quantity**
1.	Computer (PC) with latest configurations – and Internet connection with standard operating system and standard word processor and worksheet software (Licensed) (all software should either be latest version or one/two version below)	As required
2.	UPS	As required
3.	Scanner cum Printer	As required
4.	Computer Tables	As required
5.	Computer Chairs	As required
6.	LCD Projector	As required
7.	White Board 1200mm x 900mm	As required
Note: Above Tools &Equipment not required, if Computer LAB is available in the institute.		

Module 8: On-the-Job Training

Mapped to QP: TEL/Qxxxx, v1.0

Mandatory Duration: 220:00	**Recommended Duration: 00:00**
Location: On-Site	

Terminal Outcomes

- Plan and execute drone-based RF surveys based on defined objectives, terrain analysis, and coverage goals.
- Collaborate with drone pilots to optimise flight paths and ensure adherence to survey parameters and airspace permissions.
- Configure drones and RF payloads by integrating compatible RF measurement tools and ensuring system readiness.
- Calibrate RF sensors and ground control systems to maintain measurement accuracy prior to deployment.
- Use GIS and mapping tools to design and visualise RF survey routes and data collection zones.
- Conduct real-time RF data collection using drone-mounted sensors across diverse terrains and network zones.
- Extract and validate RF signal strength data by checking timestamps, location metadata, and signal attributes.
- Process raw RF data by cleaning duplicates, filtering noise, and standardising formats for analysis.
- Generate RF signal plots and visual heatmaps to identify trends, anomalies, and signal variations.
- Compare real-time RF readings with expected network benchmarks to detect weak zones and misalignments.
- Identify and map RF interference sources using frequency scanning and spectrum analysis tools.
- Assess environmental and structural factors affecting signal quality using terrain, building, and vegetation overlays.
- Recommend antenna alignment adjustments, placements, and tilt changes based on analysed RF data trends.
- Perform post-alignment validation surveys to assess improvements in signal strength and coverage.
- Develop technical reports and summaries of signal coverage, interference issues, and optimisation recommendations.
- Demonstrate adherence to safety regulations and airspace compliance during drone-based RF survey operations.
- Implement pre-flight safety inspections and hazard mitigation protocols at survey sites.
- Promote eco-friendly practices including proper disposal of drone batteries and RF equipment components.
- Role-play emergency response scenarios and simulate communication protocols during operational failures.

- Maintain structured records of survey activities, regulatory compliance, environmental observations, and safety audits.

Annexure

Trainer Requirements (RF Engineer – Drone-Based Surveys)

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
BE/B. Tech	Any Field	2	Drone operations, Telecom infrastructure deployment, UAV-based infrastructure inspection or other relevant domains.	-	-	Eligible for ToT program
ME/M. Tech	Any Field	1	Drone operations, Telecom infrastructure deployment, UAV-based infrastructure inspection or other relevant domains.	-	-	Eligible for ToT program

Trainer Certification	
Domain Certification	**Platform Certification**
Certified for Job Role "**Radio Frequency Engineer - Drone Based Survey**", "TEL/Q6226, v1.0", Minimum accepted score is 80%	Certified for Job Role: "**Trainer (VET and Skills)", mapped to Qualification Pack: "MEP/Q2601, v3.0",** Minimum accepted score as per MEPSC guidelines is 80%.

Assessor Requirements (RF Engineer – Drone-Based Surveys)

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training/Assessment Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
BE/B. Tech	Any Field	2	Drone operations, Telecom infrastructure deployment, UAV-based infrastructure inspection or other relevant domains.	-	-	Eligible for ToA program
ME/M. Tech	Any Field	1	Drone operations, Telecom infrastructure deployment, UAV-based infrastructure inspection or other relevant domains.	-	-	Eligible for ToA program

Assessor Certification	
Domain Certification	**Platform Certification**
Certified for Job Role "**Radio Frequency Engineer - Drone Based Survey**", "TEL/Q6226, v1.0", Minimum accepted score is 80%	Certified for Job Role: "**Assessor (VET and Skills)", mapped to Qualification Pack: "MEP/Q2701, v3.0",** Minimum accepted score as per MEPSC guidelines is 80%.

Trainer Requirements (Employability Skills 90 hours)

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	**Specialization**	**Years**	**Specialization**	
Graduate/CITS	Any discipline			2	Teaching experience	Prospective ES trainer should: • have good communication skills • be well versed in English • have digital skills • have attention to detail • be adaptable • have willingness to learn
Current ITI trainers	Employability Skills Training (3 days full-time course done between 2019-2022)					
Certified current EEE trainers (155 hours)	from Management SSC (MEPSC)					
Certified Trainer	Qualification Pack: Trainer (MEP/Q0102)					

Assessor Certification	
Domain Certification	**Platform Certification**
Certified in 90-hour Employability NOS (2022), with a minimum score of 80% OR Certified in 120-hour Employability NOS (2022), with a minimum score of 80%	NA

Master Trainer Requirements (Employability Skills 90 hours)

Master Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	**Specialization**	**Years**	**Specialization**	
Graduate/CITS	Any discipline			3	Employability Skills curriculum training experience with an interest to train as well as orient other peer trainers	Prospective ES trainer should: • have good communication skills • be well versed in English • have digital skills • have attention to detail • be adaptable • have willingness to learn • be able to grasp concepts fast and is creative with teaching practices and likes sharing back their learning with others
Certified Master Trainer	Qualification Pack: Master Trainer (MEP/Q2602			3	EEE training of Management SSC (MEPSC) (155 hours)	

Assessor Certification	
Domain Certification	**Platform Certification**
Certified in 90-hour Employability NOS (2022), with a minimum score of 90%. OR Certified in 120-hour Employability NOS (2022), with a minimum score of 90%	NA

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.

Assessment Strategy (Employability Skills 90 hours)

The trainee will be tested for the acquired skill, knowledge and attitude through formative/summative assessment at the end of the course and as this NOS and MC is adopted across sectors and qualifications, the respective AB can conduct the assessments as per their requirements.

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