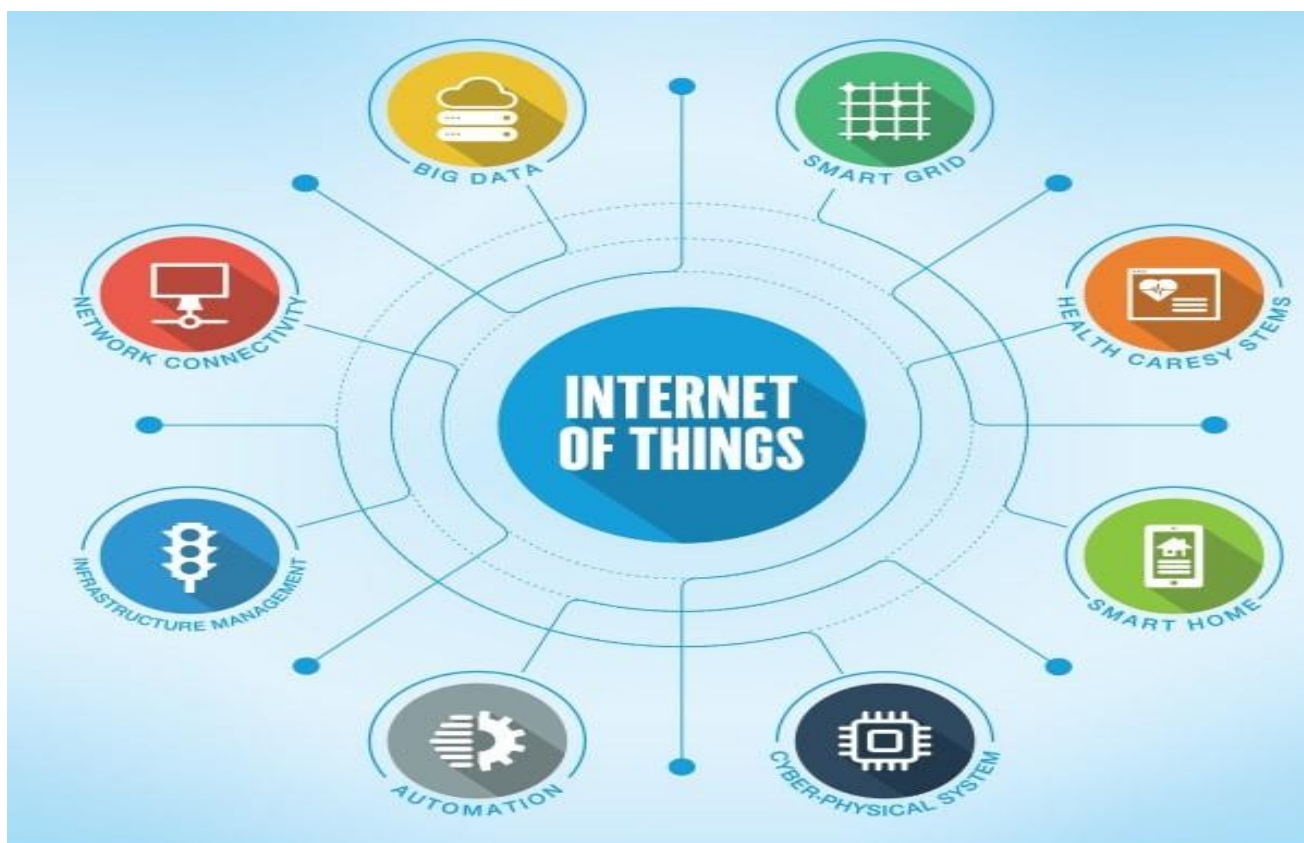




Model Curriculum

QP Name: Telecom Technician - IoT Devices/Systems

QP Code: TEL/Q6210

Version: 5.0

NSQF Level: 4.0

Model Curriculum Version: 5.0

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Training Parameters

Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Network Operation and Maintenance
Country	India
NSQF Level	4.0
Aligned to NCO/ISCO/ISIC Code	NCO-2015/3114.0803
Minimum Educational Qualification and Experience	12th grade pass OR Completed 2nd year of the 3-year diploma after 10th in Electronics and Communication Engineering/ Computer Engineering / IoT and Smart Devices/ Embedded Systems Design OR 10th-grade pass with 3 years of experience in IoT Devices/ Optical Fiber/Broadband Domain OR Previous relevant Qualification of NSQF Level 3.0 with 3 years of experience in IoT Devices/ Optical Fiber/Broadband Domain OR Previous relevant Qualification of NSQF Level 3.5 with 1.5 years of experience in IoT Devices/ Optical Fiber/Broadband Domain
Pre-Requisite License or Training	NA
Minimum Job Entry Age	NA
Last Reviewed On	08-05-2025
Next Review Date	30-04-2028
NSQC Approval Date	08-05-2025
QP Version	5.0
Model Curriculum Creation Date	10-03-2025
Model Curriculum Valid Up to Date	30-04-2028
Model Curriculum Version	5.0
Minimum Duration of the Course	510 Hours

Maximum Duration of the Course

510 Hours

Program Overview

This section summarises 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:

- Explain the process of installing and configuring IoT devices at customer premises.
- Describe the steps involved in performing level 1 troubleshooting of IoT devices.
- Discuss sustainable practices in telecom infrastructure installation, including waste management and energy efficiency.
- Elucidate the importance of complying with environmental regulations and maintaining records of sustainability measures in telecom projects.
- Discuss the Employability and Entrepreneurship Skills.

Compulsory Modules

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

NOS and Module Details	Theory Duration (Hours)	Practical Duration (Hours)	On-the-Job Training Duration (Mandatory) (Hours)	On-the-Job Training Duration (Recommended) (Hours)	Total Duration (Hours)
TEL/N6234: Install and configure IoT devices at customer premises NOS Version No.: 4.0 NSQF Level: 4.0	60:00	100:00	80:00	00:00	240:00
Module 1: Introduction to the sector and the job role of a Telecom Technician - IoT Devices/Systems	05:00	00:00	00:00	00:00	05:00
Module 2: Analyze Requirements and Install IoT Devices	25:00	50:00	40:00	00:00	115:00
Module 3: Configure IoT Devices and Test Connectivity	30:00	50:00	40:00	00:00	120:00
TEL/N6236: Perform level 1 troubleshooting of IoT devices NOS Version No.: 4.0 NSQF Level: 4.0	50:00	90:00	70:00	00:00	210:00

Module 4: Perform Level 1 Troubleshooting of IoT Devices	50:00	90:00	70:00	00:00	210:00
TEL/N9105: Follow sustainable practices in telecom infrastructure installation NOS Version No.: 1.0 NSQF Level: 4.0	10:00	20:00	00:00	00:00	30:00
Module 5: Sustainability Practices in Telecom Infrastructure Installation	10:00	20:00	00:00	00:00	30:00
DGT/VSQ/N0101: Employability Skills (30 Hours) NOS Version No.: 1.0 NSQF Level: 2.0	30:00	00:00	00:00	00:00	30:00
Module 6: Employability Skills (30 Hours)	30:00	00:00	00:00	00:00	30:00
Total Duration	150:00	210:00	150:00	00:00	510:00

Module Details

Module 1: Introduction to the sector and the job role of a Telecom Technician - IoT Devices/Systems

Mapped to TEL/N6234, v4.0

Terminal Outcomes:

- Explain the importance of Telecom Sector.
- Discuss the roles and responsibilities of a Telecom Technician - IoT Devices/Systems.

Duration (in hours): 05:00	Duration (in hours): 00:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
• Explain the significance of the telecom sector in the manufacturing and assembly of IoT devices and systems. • Elucidate the key skills and technical expertise required for a Telecom Technician specializing in IoT devices and systems. • Describe the challenges faced in assembling and testing IoT devices and systems in the telecom sector. • Determine the impact of precision and quality control in the assembly of IoT devices and systems for telecom applications. • Discuss the roles and responsibilities of a Telecom Technician in ensuring efficient and high-quality production of IoT devices and systems.	
Classroom Aids	
Training Kit - Facilitator's Guide, Participant's Handbook, Presentations and Software, Whiteboard, Marker, Projector, Laptop, Video Films	
Tools, Equipment and Other Requirements	
Nil	

Module 2: Analyze Requirements and Install IoT Devices

Mapped to TEL/N6234, v4.0

Terminal Outcomes:

- Explain how to analyze requirements for IoT devices.
- Describe the process for installing IoT devices at suitable points or locations.

Duration (in hours): 25:00	Duration (in hours): 50:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
• Explain the principles of IoT architecture, including the roles of microcontrollers, sensors, actuators, gateways, and cloud platforms. • Discuss the applications of IoT in smart cities, healthcare, Industry 4.0, and agriculture. • Describe the communication technologies used in IoT, including 5G, NB-IoT, LoRaWAN, Wi-Fi, Bluetooth, and Zigbee. • Explain IoT data transfer protocols and their role in machine-to-machine communication. • Elucidate the workings of Ethernet, TCP/IP, and VPN in IoT installations. • Explain the cellular IoT technologies, including LTE-M and 5G variants. • Describe wireless IoT technologies such as Wi-Fi 6, Zigbee, and LoRaWAN. • Explain the process of installing and configuring smart meters, connected cameras, and industrial IoT devices. • Discuss the impact of signal interference, data packet loss, and power failures on IoT performance. • Explain proper handling, grounding, and safety measures during IoT device installations.	• Demonstrate how to identify various types of microprocessor boards and microcontrollers used in IoT installations. • Show how to determine the functions, characteristics, and applicability of different IoT sensors and actuators. • Demonstrate how to select appropriate short-range and long-range communication protocols for IoT applications. • Show how to check the components, pin configurations, and interconnectivity provisions of microcontroller boards. • Demonstrate how to differentiate between IoT nodes and gateways, assessing their roles in data transmission and network management. • Show how to determine optimal installation points considering environmental factors, power supply availability, and network signal strength. • Demonstrate how to establish communication line connectivity using suitable nodes, gateways, and networks. • Show how to mount IoT devices securely using industry-approved techniques and tools. • Demonstrate how to connect and secure power supply sources while ensuring proper grounding and compliance with safety standards. • Show how to perform signal strength testing and RF spectrum analysis to optimize IoT device placement.
Classroom Aids	

Training Kit - Facilitator's Guide, Participant's Handbook, Presentations and Software, Whiteboard, Marker, Projector, Laptop, Video Films

Tools, Equipment and Other Requirements

Smartphone, Router With Power Adaptor, Programmed Microcontroller Boards (Raspberry Pi 3 And Arduino), Network Tool Kit (Including Cable Stripper, Crimper, LAN Cable Tester), Network Cables (Ethernet Cable CAT 6, USB Cables, HDMI Cables), IoT-Enabled Sensors (Pressure Sensor, Temperature And Humidity Sensor, Proximity Sensor, Touch Sensor, Surveillance Cameras), Hand Tool Kit (450 W Power Drill, Phillips Screwdrivers, Nose Pliers, Adjustable Wrench, Utility Knife, Electrical Tester, Measuring Tape 5m, And Electrical Tape), Gateway, Ethernet Cable Connectors, Digital Multimeter.

Module 3: Configure IoT Devices and Test Connectivity

Mapped to TEL/N6234, v4.0

Terminal Outcomes:

- Elucidate the steps to configure IoT devices for effective data transfer.
- Discuss the methods to test connections between nodes, gateways, and backend servers.

Duration (in hours): 30:00	Duration (in hours): 50:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
• Explain the configuration and troubleshooting process of cloud-based IoT management platforms. • Describe the common IoT cybersecurity threats and preventive measures. • Elucidate the tools and techniques for RF signal strength measurement and spectrum analysis. • Discuss the security standards and compliance requirements, including ISO 27001, GDPR, and NIST. • Explain the importance of robust battery backups and energy-efficient IoT deployments. • Describe remote diagnostics, monitoring tools, and predictive maintenance methodologies. • Elucidate best practices for writing and debugging software code for IoT microcontrollers. • Discuss the integration of edge computing and AI in IoT installations and real-time data processing. • Explain the hazards of RF radiation exposure and the appropriate safety procedures. • Describe the use of fog computing to reduce latency in telecom applications.	• Demonstrate how to set up appropriate connectivity options on microcontroller boards for seamless data transfer. • Show how to use compatible cable connectors and microcontrollers to link IoT devices with data transfer interfaces. • Demonstrate how to install and configure firmware/software frameworks for IoT device communication with cloud platforms. • Show how to compile and upload software code to microcontrollers while ensuring compatibility with communication protocols. • Demonstrate how to debug software errors and optimize system performance using emulators and network testing tools. • Show how to verify the proper execution of installed software by setting up nodes and gateways correctly. • Demonstrate how to validate data transfer between devices using system logs, LED indicators, or real-time dashboards. • Show how to establish effective connectivity between IoT gateways and backend cloud platforms or local networks. • Demonstrate how to perform network performance testing to detect latency, packet loss, or interference issues. • Show how to confirm data reception at the backend server and escalate unresolved connectivity issues.
Classroom Aids	

Training Kit - Facilitator's Guide, Participant's Handbook, Presentations and Software, Whiteboard, Marker, Projector, Laptop, Video Films

Tools, Equipment and Other Requirements

Smartphone, Router With Power Adaptor, Programmed Microcontroller Boards (Raspberry Pi 3 And Arduino), Network Tool Kit (Including Cable Stripper, Crimper, LAN Cable Tester), Network Cables (Ethernet Cable CAT 6, USB Cables, HDMI Cables), IoT-Enabled Sensors (Pressure Sensor, Temperature And Humidity Sensor, Proximity Sensor, Touch Sensor, Surveillance Cameras), Hand Tool Kit (450 W Power Drill, Phillips Screwdrivers, Nose Pliers, Adjustable Wrench, Utility Knife, Electrical Tester, Measuring Tape 5m, And Electrical Tape), Gateway, Ethernet Cable Connectors, Digital Multimeter.

Module 4: Perform Level 1 Troubleshooting of IoT Devices

Mapped to TEL/N6236, v4.0

Terminal Outcomes:

- Describe the process to troubleshoot IoT nodes and gateways.
- Explain the methods to troubleshoot communication devices.

Duration (in hours): 50:00	Duration (in hours): 90:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
• Explain the common IoT cybersecurity threats and the preventive measures to mitigate them. • Describe the communication protocols and methodologies used for troubleshooting IoT devices. • Elucidate the role of remote monitoring tools in predictive maintenance and fault detection. • Explain the tools and techniques for diagnosing network latency and interference issues. • Discuss the proper escalation procedures for unresolved hardware and software failures. • Describe the processes involved in IoT device authentication, encryption (AES-256), and secure access controls. • Explain the configuration of cloud-based IoT troubleshooting platforms and their applications. • Elucidate best practices for performing firmware updates and implementing security patches. • Discuss compliance with IoT security standards such as ISO 27001, GDPR, ETSI, and TRAI. • Describe how to use diagnostic software to interpret and analyze sensor and network performance data.	• Demonstrate how to set up a test environment and develop a structured troubleshooting plan for IoT devices. • Show how to verify connectivity between sensors, microcontrollers, and other components using diagnostic tools. • Demonstrate how to inspect wiring, pin configurations, and power supply connections for faults. • Show how to reload or update software and firmware on IoT nodes and gateways. • Demonstrate how to check onboard memory storage and validate the accuracy of stored sensor data. • Show how to maintain accurate logs of performance tests and document corrective actions taken. • Demonstrate how to inspect and verify the functionality of communication modules, including Wi-Fi, 5G, NB-IoT, and LoRaWAN. • Show how to reconfigure device credentials, security settings, and network authentication parameters. • Demonstrate how to measure communication link performance between IoT nodes and gateways. • Show how to perform protocol-level debugging for MQTT, CoAP, and HTTP communications. • Demonstrate how to reset network configurations and conduct comprehensive connectivity tests. • Show how to escalate unresolved technical issues to the engineering team effectively.

Classroom Aids

Training Kit - Facilitator's Guide, Participant's Handbook, Presentations and Software, Whiteboard, Marker, Projector, Laptop, Video Films

Tools, Equipment and Other Requirements

Smartphone, Router With Power Adaptor, Programmed Microcontroller Boards (Raspberry Pi 3 And Arduino), Network Tool Kit (Including Cable Stripper, Crimper, LAN Cable Tester), Network Cables (Ethernet Cable CAT 6, USB Cables, HDMI Cables), IoT-Enabled Sensors (Pressure Sensor, Temperature And Humidity Sensor, Proximity Sensor, Touch Sensor, Surveillance Cameras), Hand Tool Kit (450 W Power Drill, Phillips Screwdrivers, Nose Pliers, Adjustable Wrench, Utility Knife, Electrical Tester, Measuring Tape 5m, And Electrical Tape), Gateway, Ethernet Cable Connectors, Digital Multimeter.

Module 5: Sustainability Practices in Telecom Infrastructure Installation

Mapped to TEL/N9105, v1.0

Terminal Outcomes:

- Explain sustainable practices in telecom infrastructure installation, including waste management and energy efficiency.
- Discuss compliance with environmental regulations and the importance of maintaining records of sustainability measures.

Duration (in hours): 10:00	Duration (in hours): 20:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
• Explain national and international environmental laws and regulations governing telecom infrastructure installation. • Describe e-waste management and recycling policies applicable to telecom sites. • Identify occupational safety and health standards related to environmental practices. • List recyclable and refurbishable telecom components and their proper handling techniques. • Define methods for reducing electronic waste through responsible procurement and reuse. • Explain advancements in eco-friendly telecom infrastructure and the use of renewable energy sources. • Elucidate techniques for optimizing energy consumption in telecom operations. • Describe proper disposal methods for hazardous and non-hazardous waste. • Explain procedures for collaborating with authorized agencies for waste collection and disposal. • Identify best practices for reducing the carbon footprint of telecom installations.	• Show how to identify telecom components suitable for recycling or refurbishment. • Demonstrate the process of sorting electronic and non-electronic waste according to disposal protocols. • Show the correct labeling and storage of recyclable and refurbishable components. • Demonstrate the safe handling and disposal of hazardous and non-hazardous waste. • Show the proper coordination process with authorized e-waste recycling units or disposal agencies. • Demonstrate the use of energy-efficient tools and equipment during telecom installations. • Show how to optimize infrastructure placement to minimize energy consumption. • Demonstrate the maintenance of records for waste disposal and sustainability measures. • Show how to guide team members on sustainable practices and encourage environmentally responsible habits.
Classroom Aids	
Training Kit - Facilitator's Guide, Participant's Handbook, Presentations and Software, Whiteboard, Marker, Projector, Laptop, Video Films	

Tools, Equipment and Other Requirements

Protective Gloves, Safety Goggles, E-Waste Segregation Bins, Labels and Markers, Power Tools, Digital Multimeter, Circuit Testers

Module 6: Employability Skills (30 Hours)

Mapped to DGT/VSQ/N0101, v1.0

Duration (in hours): 30:00

Key Learning Outcomes

After completing this programme, participants will be able to:

Introduction to Employability Skills Duration: 1 Hour

After completing this programme, participants will be able to:

1. Discuss the importance of Employability Skills in meeting the job requirements

Constitutional values - Citizenship Duration: 1 Hour

2. Explain constitutional values, civic rights, duties, citizenship, responsibility towards society etc. that are required to be followed to become a responsible citizen.

3. Show how to practice different environmentally sustainable practices

Becoming a Professional in the 21st Century Duration: 1 Hour

4. Discuss 21st-century skills.
5. Display a positive attitude, self-motivation, problem-solving, time management skills and continuous learning mindset in different situations.

Basic English Skills Duration: 2 Hours

6. Use appropriate basic English sentences/phrases while speaking

Communication Skills Duration: 4 Hours

7. Demonstrate how to communicate in a well-mannered way with others.
8. Demonstrate working with others in a team

Diversity & Inclusion Duration: 1 Hour

9. Show how to conduct oneself appropriately with all genders and PwD
10. Discuss the significance of reporting sexual harassment issues in time

Financial and Legal Literacy Duration: 4 Hours

11. Discuss the significance of using financial products and services safely and securely.
12. Explain the importance of managing expenses, income, and savings.
13. Explain the significance of approaching the concerned authorities in time for any exploitation as per legal rights and laws

Essential Digital Skills Duration: 3 Hours

14. Show how to operate digital devices and use the associated applications and features, safely and securely
15. Discuss the significance of using the internet for browsing, and accessing social media platforms, safely and securely

Entrepreneurship Duration: 7 Hours

16. Discuss the need for identifying opportunities for potential business, sources for arranging money and potential legal and financial challenges

Customer Service Duration: 4 Hours

17. Differentiate between types of customers

18. Explain the significance of identifying customer needs and addressing them

19. Discuss the significance of maintaining hygiene and dressing appropriately

Getting ready for Apprenticeship & Jobs Duration: 2 Hours

20. Create a biodata

21. Use various sources to search and apply for jobs

22. Discuss the significance of dressing up neatly and maintaining hygiene for an interview

23. Discuss how to search and register for apprenticeship opportunities

Module 7: On-the-Job Training

Mapped to Telecom Technician - IoT Devices/Systems

Mandatory Duration (in hours): 150:00	Recommended Duration (in hours): 00:00
Location: On-Site	
Terminal Outcomes • Demonstrate how to analyze requirements for IoT devices. • Show how to install IoT devices at suitable points or locations. • Demonstrate the steps to configure IoT devices for effective data transfer. • Show how to test connections between nodes, gateways, and backend servers. • Demonstrate the process to troubleshoot IoT nodes and gateways. • Show how to troubleshoot communication devices. • Demonstrate sustainable practices in telecom infrastructure installation, including waste management and energy efficiency. • Show how to comply with environmental regulations and maintain records of sustainability measures.	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialisation	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
Graduate	Electronics and Communication /Telecom/ Information Technology/ Computer Science and other relevant fields	6	IoT Devices/ Optical Fiber/ Broadband Domain			

Trainer Certification	
Domain Certification	Platform Certification
Certified for Job Role: “Telecom Technician - IoT Devices/Systems” mapped to QP: “TEL/Q6210, v5.0”. Minimum accepted score is 80%.	Recommended that the Trainer is certified for the Job Role: “Trainer (VET and Skills)”, mapped to the Qualification Pack: “MEP/Q2601, v3.0”. The minimum accepted score as per MEPSC guidelines is 80%.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	Specialization	Years	Specialization	
Graduate	Electronics and Communication /Telecom/ Information Technology/ Computer Science and other relevant fields	6	IoT Devices/ Optical Fiber/ Broadband Domain			

Assessor Certification	
Domain Certification	Platform Certification
Certified for Job Role: “Telecom Technician - IoT Devices/Systems” mapped to QP: “TEL/Q6210, v5.0”. Minimum accepted score is 80%.	Certified for the Job Role: “Assessor (VET and Skills)”, mapped to the Qualification Pack: “MEP/Q2701, v3.0”, with a minimum score of 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
- 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 levels 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
- Assessor must be ToA certified & trainer must be ToT Certified
- 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:

- Surprise visit to the assessment location
- 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

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	Key learning outcome is the 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 it upon the completion of the training.
Terminal Outcome	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
NCVET	National Council for Vocational Education and Training
QP	Qualification Pack
MC	Model Curriculum
NSQF	National Skills Qualification Framework
NSQC	National Skills Qualification Committee
NOS	National Occupational Standards
NCO	National Classification of Occupations
ES	Employability Skills
TSSC	Telecom Sector Skill Council
TRAI	Telecom Regulatory Authority of India
IoT	Internet of Things
NB-IoT	Narrowband Internet of Things
LoRaWAN	Long Range Wide Area Network
LED	Light Emitting Diode
ISO	International Organization for Standardization
GDPR	General Data Protection Regulation
NIST	National Institute of Standards and Technology
AES	Advanced Encryption Standard
MQTT	Message Queuing Telemetry Transport
CoAP	Constrained Application Protocol
HTTP	HyperText Transfer Protocol
LAN	Local Area Network