Model Curriculum

QP Name: Technician – Automatic Train Protection System (ATPS)

QP Code: TEL/Q6304

QP Version: 2.0

NSQF Level: 4

Model Curriculum Version: 1.0

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Training Parameters

Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Project Engineering
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/NA
Minimum Educational Qualification and Experience	12th grade pass **OR** Completed 2nd year of 3-year diploma (after 10th) **OR** Pursuing 2nd year of 3-year regular Diploma (after 10th) **OR** 10th grade pass with two years of any combination of NTC/NAC/CITS or equivalent **OR** 8th pass plus 2-year NTC plus 1-Year NAC plus 1-Year CITS **OR** 10th grade pass and pursuing continuous schooling With No Experience required **OR** Previous relevant Qualification of NSQF Level 3.0 with 3-year relevant experience
Pre-Requisite License or Training	NA
Minimum Job Entry Age	17 Years
Last Reviewed On	26/05/2022
Next Review Date	26/05/2025
NSQC Approval Date	26/05/2022
QP Version	2.0
Model Curriculum Creation Date	26/05/2022
Model Curriculum Valid Up to Date	26/05/2025
Model Curriculum Version	1.0
Minimum Duration of the Course	270 Hours
Maximum Duration of the Course	450 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:

- Demonstrate the process of hand soldering of components
- Understand different kinds of electronic parts or components & connectors and their specifications.
- Demonstrate the process of fiber constructs.
- Classify different kinds of optical fiber cable types and identify their selection criteria.
- Demonstrate the process of installation of fiber cables and its deployment.
- Identify feeder and distribution and power test using Optical Line Test Set (OLTS).
- Manage tools and spares.
- Prepare the cable for splicing for new installation.
- Perform maintenance activities of the laid optical fiber.
- Complete fiber splicing operations for new installation.
- Install cable/system wiring and equipment at customer premises.
- Perform up-gradation of location infrastructure.
- Discuss how to maintain the effectiveness of change process.
- Explain the process of determining the scope of work.
- Explain the process of preparing for the installation of telecom equipment.
- Explain the process of assisting in the installation of tower equipment and performing LOS check.
- Explain the process of assisting in the shelter room installations.
- Explain the process of assisting in completing documentation.
- Describe the process of preparing for the installation of RFID tags.
- Demonstrate the process of carrying out the programming of RFID tags.
- Demonstrate the process of installing the RFID tags on PSC sleepers.
- Demonstrate the process of carrying out documentation and review.
- Prepare for installation.
- Connect power and traffic cable to the equipment.
- Record and report.
- Assess network topology to develop commissioning plan and test procedure.
- Configure the installed equipment.
- Report and record the test effectiveness of the installed equipment.

Compulsory Modules

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

Skills Provided by IRISET	NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
Wiring and soldering	**TEL/N2500 - High density hand soldering of component on telecom boards** **NOS Version - 1.0** **NSQF Level - 4**	**05:00**	**14:00**	**11:00**	**00:00**	**30:00**
	Module 1: High density hand soldering of component on telecom boards	05:00	14:00	11:00	00:00	30:00
Optical Fiber Cable (OFC) Measurements, Fiber Testing & Rectification	**TEL/N4126 - Handling fiber constructs, performance and selection criteria** **NOS Version - 2.0** **NSQF Level- 4**	**05:00**	**14:00**	**11:00**	**00:00**	**30:00**
	Module 2: Handling fiber constructs, performance, and selection criteria	05:00	14:00	11:00	00:00	30:00
	TEL/N4200 - Installation of passive FTTH/X components **NOS Version - 2.0** **NSQF Level- 4**	**03:00**	**14:00**	**13:00**	**00:00**	**30:00**
	Module 3: Installation of Passive FTTH/X Components	03:00	14:00	13:00	00:00	30:00
OFC Cable & Splicing	**TEL/N6400 - Splice Optical Fiber** **NOS Version - 2.0** **NSQF Level- 3**	**10:00**	**20:00**	**30:00**	**00:00**	**60:00**
	Module 4: Prepare for Splicing Operations for New Installation	5:00	10:00	15:00	00:00	30:00
	Module 5: Maintenance and Splicing of Optical Fibre	5:00	10:00	15:00	00:00	30:00
a. Copper Cable & Terminations **b. Copper Cable & Jointing**	**TEL/N0111 - Lay cable/system wiring and install equipment at customer premises** **NOS Version - 2.0** **NSQF Level- 4**	**10:00**	**20:00**	**30:00**	**00:00**	**60:00**
	Module 6: Install cable/system wiring and equipment at customer premises	10:00	20:00	30:00	00:00	60:00

Type of Radio Frequency (RF) Antennas, Ultra High Frequency (UHF) Antenna & Feeder Cables	**TEL/N6210 - Perform change management at radio locations NOS Version - 2.0 NSQF Level - 5**	**10:00**	**20:00**	**30:00**	**00:00**	**60:00**
	Module 7: Perform change management at radio locations	10:00	20:00	30:00	00:00	60:00
Mounting and Alignment of Antenna on a Tower - Mast Rigger	**TEL/N6310 - Assist in the installation of telecom equipment NOS Version - 1.0 NSQF Level- 3**	**08:00**	**12:00**	**10:00**	**00:00**	**30:00**
	Module 8: Process of assisting the installation of telecom equipment	08:00	12:00	10:00	00:00	30:00
Fitting of Radio Frequency Identification (RFID) Tags on Pre-stressed Concrete Sleeper (PSC) Sleepers as per Tag Tin Plan	**TEL/N6311 - Install RFID tags on PSC sleepers NOS Version - 1.0 NSQF Level- 4**	**03:00**	**12:00**	**15:00**	**00:00**	**30:00**
	Module 9: Process of installing RFID tags on PSC sleepers	03:00	12:00	15:00	00:00	30:00
Networking Layer 1: Physical Layer Layer 2: Data Link Layer Layer 3: Network Layer	**TEL/N6300 - Install SDH, DWDM, L2 and L3 Equipment NOS Version - 1.0 NSQF Level- 4**	**03:00**	**12:00**	**15:00**	**00:00**	**30:00**
	Module 10: Install SDH, DWDM, L2 and L3 Equipment	03:00	12:00	15:00	00:00	30:00
	TEL/N6302 - Perform commissioning of SDH, DWDM, L2 and L3 equipment NOS Version - 2.0 NSQF Level - 5	**03:00**	**12:00**	**15:00**	**00:00**	**30:00**
	Module 11: Perform commissioning of SDH, DWDM, L2 and L3 equipment	03:00	12:00	15:00	00:00	30:00
	DGT/VSQ/N0102 Employability Skills (60 Hours)	60:00	00:00	00:00	00:00	60:00
	Total Duration	**120:00**	**150:00**	**180:00**	**00:00**	**450:00**

Module Details

Module 1: High density hand soldering of component on telecom boards
Mapped to TEL/N2500 v1.0

Terminal Outcomes:

- Demonstrate the process of hand soldering of components
- Understand different kinds of electronic parts or components & connectors and their specifications.

Duration: 05:00	Duration: 14:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Develop board and material/components for soldering on telecom boards. - Explain the basics of CAD specification. - Follow IPC standards for soldering activity. - Select correct solder bit, soldering wire and correct flux and check component leads and boards for any contamination.	- Examine the impact of temperature and humidity on high-density soldering. - Handle different kinds of electronic parts or components & connectors and their specifications. - Set the correct orientation of components on telecom boards.
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Ball Grid Array (BGA) chip, de-soldering and soldering station, hot air gun, microscope, zinc and copper wire fume extractor, flux, Sponge, brass wool, ESO brush, Iso- Propyl Alcohol (IPA), lint-free cloth, automatic screwing machine, Hand Tools – (Precision screwdrivers, solder, flux, jumper wires, cutter, tweezer, wire strippers etc.)	

Module 2: Handling fiber constructs, performance and selection criteria
Mapped to TEL/N4126 v2.0

Terminal Outcomes:

- Demonstrate the process of fiber constructs.
- Classify different kinds of optical fiber cable types and identify their selection criteria.

Duration: 05:00	Duration: 14:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Explain basics of optical fiber cable constructions. - Identify primary fiber cable differentiators – simplex and zip cords, distribution cable and break-out cables. - Relate cable identifiers and primary requirements. - List the fiber standard colour codes. - Outline single mode optical fiber cable specifications and ITU-T standardizations.	- Classify the optical fiber cable types – ribbon fiber cables, underground/ buried cables, aerial cables, underwater and submarine cables. - Identify the optical fiber cable selection criteria like pulling strength, rodent penetration, grounding and bonding.
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Different types of optical fiber cables – multi-tube single jacket duct fiber cable, multi-tube double jacket dielectric armoured fiber, uni-tube single jacket ribbon fiber cable, multitube single jacket armoured figure-8 cable, multitube double jacket ADSS fiber cable	

Module 3: Installation of passive FTTH/X components
Mapped to TEL/N4200 v2.0

Terminal Outcomes:

- Demonstrate the process of installation of fiber cables and its deployment.
- Identify feeder and distribution and power test using OLTS

Duration: 03:00	Duration: 14:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Trace the passive network components and their deployment environment. - Outline the concept of feeder and distribution connections in a splitter - Distinguish types of optical splitter and relative features. - Identify the splitter required on ground. - Identify feeder and distribution – ports, cables/pigtails and connections on the devices. - Define power test procedure and principle.	- Demonstrate installation for wall mount splitters (1X8, 1X16, 1X32) - Test the optical splitters – insertion loss and power output measurement (using OLTS and Light Source)
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Optical power meter, Fiber optic test source, OLTS, Optical splitters, Pigtails	

Module 4: Prepare for Splicing Operations for New Installation
Mapped to TEL/N6400 v1.0

Terminal Outcomes:

- Manage tools and spares.
- Prepare the cable for splicing for new installation.

Duration: 05:00	Duration: 10:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Discuss the characteristics of Optical Fiber, (like refraction, polarization, attenuation, dispersion, etc.) - Explain the uses of various optical equipment (spool, joint closure, connectors, splicer and cleaver), optical test equipment (Optical Time Domain Reflectometer (OTDR), power meter, etc.), and other tools and equipment, like joint kits, pigtails, patch cords, FDF (Fiber Distribution Frame), ODB (Optical Distribution Box) connector, protection sleeves and heat shrink, etc. - Describe fault analysis procedures and safety measures for different tools and mechanical equipment. - Discuss the importance of calibrating the test equipment. - Explain the color coding of optical fiber cable. - Discuss the steps of preparing the cable for splicing for new installation.	- Identify the tools and equipment required for optical fiber splicing Demonstrate the operations of various tools and equipment required for optical fiber splicing. - Inspect Optical Time Domain Reflectometer (OTDR), Power Meter, Joint Closure, Connectors, Splicer, Cleaver, and other mechanical tools/equipment for any fault and calibration status. - Employ appropriate practices to find out sheath damage in the cable and secure the cable to avoid the damage. - Demonstrate the steps to prepare the cable for splicing for new installation.
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Optical cable test equipment (Optical Time Domain Reflectometer (OTDR), power meter, etc.), Optical equipment (Spool, Joint closure, Connectors, Splicer and Cleaver), Joint kits, Pigtails, Patch cords, FDF (Fiber Distribution Frame), ODB (Optical Distribution Box) Connector, Protection sleeves and Heat shrink, RCC (Reinforced Cement Concrete) joint chambers, Cable drum	

Module 5: Maintenance and Splicing of Optical Fiber

Mapped to TEL/N6400 v1.0

Terminal Outcomes:

- • Perform maintenance activities of the laid optical fiber.
- • Complete fiber splicing operations for new installation.

Duration: 05:00	Duration: 10:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Discuss the principles of optical transport media - Discuss signal strength and quality KPIs of optical fiber cables - Explain the processes of preventive maintenance of the laid optical fiber cables - Interpret the standard operating procedures while performing preventive maintenance of the laid optical fiber cables - Describe the procedures of sealing joints, heat shrinking/ multi-diameter seals/ mechanical seals, etc. - Elaborate the optical fiber splicing process - Discuss commonly occurring alignment errors, like Axial, Angular and Poor end finish and the ways to avoid them - List the do's and don'ts while performing splicing operations.	- Perform regular maintenance activities for the laid fiber cable. - Perform sealing joint closure heat shrinking/multi-diameter seals/mechanical seals, etc. - Demonstrate splicing the optical fiber. - Draft a sample report to escalate any fault or issues to the Supervisor.
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Optical cable test equipment (Optical Time Domain Reflectometer (OTDR), power meter, etc.), Optical equipment (Spool, Joint closure, Connectors, Splicer and Cleaver), Joint kits, Pigtails, Patch cords, FDF (Fiber Distribution Frame), ODB (Optical Distribution Box) Connector, Protection sleeves and Heat shrink, RCC (Reinforced Cement Concrete) joint chambers, Cable drum	

Module 6: Install Cable/System Wiring and Equipment at Customer Premises
Mapped to TEL/N0111 v1.0

Terminal Outcomes:

- Install cable/system wiring and equipment at customer premises.

Duration: 10:00	Duration: 20:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Describe the various activities needed to be carried out prior to the installation procedure. - State the various cabling norms pertaining to laying of the cables. - Identify the cables, wire sizes and colours and connectors required as per customer requirements. - Explain the process of crimping, splicing and soldering of cables. - Analyse the work requirements received from the supervisor to plan visit to a site/customer premises for installation and carry required tools and equipment. - Discuss the importance of conducting post-installation tests after laying down cables and installing modem, router and switch. - Explain the role of a UPS, its components and its installation and repair process. State the importance of following defined procedures/work instructions issued as per SHE & OSH guidelines. - Explain the importance of maintaining and updating installation and testing records such as installation and test results, updated plans, installation documents and customer signoffs. - Discuss the importance of escalating and reporting incidents and/or emergencies.	- Demonstrate how to identify different types of cables, wires and connectors. - Perform splicing, crimping and soldering of cables. - Perform cable connectorization. - Prepare a list of probing questions to analyse the requirements of customers. Inspect indoor and outdoor cable route using a variety of techniques. - Apply basic techniques to check that the equipment installation location is near power point and has proper signal coverage. - Demonstrate how to install cable wiring. Using the tools and equipment required for installation procedures. - Demonstrate the variety of techniques to test the cable and joints for transmission loss and strength. - Install equipment such as modem, router and/or switch and UPS. - Apply basic techniques to perform checks for voltage, current and earthing, and battery in case of a defective UPS. - Demonstrate how to repair a defective UPS. - Calculate sample equipment load and compare it with UPS rating. - Dispose the installation waste and restore work site to its original state, clean of debris and waste.
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Tools and equipment, types of cables (OFC, UTP, STP, Twisted Pair etc.) and connectors (RJ-45, RJ-11 etc.), crimping tools, soldering tools and splicing tools, signal level meters /OTDR, voltmeter, digital multimeter, digital clamp meter, signal tester, electrical drill, ladder, spanner, screw driver set, nut driver set, bolt remover, cutter, angle finder, Wiring layout, Instruction manual, User Manuals, Customer Registration, Program Authentication Form, Customer Feedback form	

Module 7: Perform change management at radio locations

Mapped to TEL/N6210 v1.0

Terminal Outcomes:

- Perform up-gradation of location infrastructure.

- Discuss how to maintain the effectiveness of change process.

Duration: 10:00	Duration: 20:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Discuss the factors to judge the criticality of the faults and their impact. - Explain the SLA and organizational guidelines that a FM Engineer and the team must follow at the workplace. - Explain the organizational procedure to obtain sign-off from all the relevant parties. - Describe the administrative tasks that need to be completed after performing the upgradation activities.	- Create a sample work plan which distinguishes the upgradation activities into different categories. - Prepare an alternative work plan to be used in case of disruption in original plan. - Arrange the required equipment and software at the workplace. - Follow the organizational structure to get the components repaired or replaced. - Roleplay a situation to show how to monitor upgradation activities performed by the team and communicate the issues, if any, to the customer. - Demonstrate the steps to check the working and status of site alarm. - Update maintenance documents.
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Optical cable test equipment (Optical Time Domain Reflectometer (OTDR), power meter, etc.), Optical equipment (Spool, Joint closure, Connectors, Splicer and Cleaver), Joint kits, Pigtails, Patch cords, FDF (Fiber Distribution Frame), ODB (Optical Distribution Box) Connector, Protection sleeves and Heat shrink, RCC (Reinforced Cement Concrete) joint chambers, Cable drum	

Module 8: Process of assisting in the installation of telecom equipment

Mapped to TEL/N6310 v1.0

Terminal Outcomes:

- Explain the process of determining the scope of work.
- Explain the process of preparing for the installation of telecom equipment.
- Explain the process of assisting in the installation of tower equipment and performing LOS check.
- Explain the process of assisting in the shelter room installations.
- Explain the process of assisting in completing documentation.

Duration: 08:00	Duration: 12:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Explain the importance of adhering to the applicable safety guidelines during rigging operations. - Explain the importance and process of working safely at high elevations, and the use of appropriate safety equipment. - Explain different support mechanisms and techniques used to climb and work on different types of towers, such as guyed towers, lattice towers, monopole towers, stealth towers, etc. - Explain the common defects found in various telecom equipment - the importance of identifying and documenting Job Hazard Assessment requirements. - Explain the benefits of following checklists and Standard Operating Procedures (SOPs), such as efficiency and consistency in work. - Explain the importance of determining the client requirements by studying blueprints and carrying out work accordingly. - Explain the importance and process of carrying out pre- and post-work site audits. - Explain the benefits and process of upgrading legacy cable plants from coaxial cable to fibre. - Explain the importance and process of determining the scope of work and client's requirements. - List the relevant installation material, tools and equipment, and PPE required for telecom rigging. - Explain the importance of ensuring the 3G/ 4G/ 5G wireless system is built as per the approved drawing and is operational as per	- Demonstrate how to analyse the relevant blueprints, schematics and as-built site plan to determine the work requirements. - Demonstrate the process of carrying out antenna assembly, waveguide, and coax connector assembly and crimping as per the supervisor's instructions. - Demonstrate the process of erecting and securing telecom structures, such as steel towers, monopoles, masts and cable tray installations to facilitate the installation of telecom equipment. - Demonstrate the process of installing antennas, feeders, microwave dishes, mast head amplifiers and ancillary equipment on steel structures/ monopoles/ towers, using the appropriate safety equipment to ensure safety at heights. - Demonstrate the process of carrying out the installation of all necessary transmission equipment components including antenna mounts, surge arrestors, eNodeB, gNodeB, transmission lines, connectors etc. - Demonstrate the process of carrying out the installation of feeder cables, coax cables, and high jumpers on steel lattice towers, guyed towers, masts, rooftop and building antennas/ aerial systems. - Demonstrate the process of installing Radio Frequency (RF) antenna system and external RF hardware, such as Remote Radio Units (RRUs), Tower Mounted Amplifier (TMAs), Combiners, microwave dishes, etc. - Demonstrate the process of installing microwave antennas, such as parabolic 1 to

the design. • List the relevant documentation to be completed for client handover.	15 foot, Very High Frequency (VHF), Ultra High Frequency (UHF) antennas. • Show how to install, connect or test underground or above ground grounding systems as per the supervisor's instructions. • Show how to use coaxial connectors and coaxial preparatory tools appropriately as per the manufacturer's instructions. • Show how to measure the alignment in azimuth, tilt, roll, and height of antennas using the antenna alignment tool and change the settings as per the instructions given by the RF engineer. • Demonstrate the process of carrying out bird-proofing and waterproofing of connectors. • Demonstrate the process of installing, terminating, earthing, labelling, and testing different types of cables, such as coaxial, Ethernet, feeder and optical fibre cables for the wireless telecom system. • Demonstrate the process of installing and testing Outdoor Unit (ODUs), splitters, and Customer Premises Equipment (CPE) as per the supervisor's instructions. • Show how to use the compass, Global Positioning System (GPS) receiver, Range Finder and other relevant equipment as per the requirement. • Demonstrate the process of carrying out Passive Intermodulation (PIM) and sweep testing, following the supervisor's instructions. • Demonstrate the process of performing a Line of Sight (LOS) check to ensure signal drop or termination is not experienced. • Demonstrate the process of performing the shelter room installations as per the supervisor's instructions. • Demonstrate the process of carrying out cabling and relevant tests on the shelter room equipment to ensure their correct functioning. • Demonstrate the process of carrying out troubleshooting for any malfunctioning equipment, as required. • Prepare sample survey reports and documentation for client handover.
Classroom Aids	

Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop
Tools, Equipment and Other Requirements
Connector Crimping Pliers, Steel Strand Wire Pulling Grips, Telecom Cutting, Telecom Pliers, Telecom Wire Pulling Systems, Telecom Wrenches, Steel Towers, Monopoles, Masts, Cable Tray, Radio Frequency (RF) Connector and Jumper, Antennas, Feeders, Microwave Dishes, Mast Head Amplifiers, Ancillary Equipment, Feeder Cables, High Jumpers, Tower Mounted Amplifier (TMA), Call Distribution Unit (CDU), Radio Frequency (RF) Antenna System and External RF Hardware etc.

Module 9: Process of installing RFID tags on PSC sleepers
Mapped to TEL/N6311 v1.0

Terminal Outcomes:

- Describe the process of preparing for the installation of RFID tags.
- Demonstrate the process of carrying out the programming of RFID tags.
- Demonstrate the process of installing the RFID tags on PSC sleepers.
- Demonstrate the process of carrying out documentation and review.

Duration: 03:00	Duration: 12:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Explain the importance, functioning and various features of the Indigenous Automatic Train Protection System (iATP)-Kavach. - Explain the effectiveness of iATP-Kavach in preventing Signal Passing at Danger (SPAD) cases, and unsafe situations arising due to over speeding of trains and train collisions. - Explain the importance of ensuring high speed and low-latency communication between trains and protection systems for real-time tracking and management of trains. - Explain the functions of key system components of iATP-Kavach, i.e., Loco iATP-Kavach, Loco Pilot – OCIP, Brake Interface Unit, RFID Reader, Station iATP-Kavach, Radio Tower, Station Master – OCIP. - Explain the functioning of relevant signalling and telecommunications equipment used by railways. - Describe the communication process between Stationary iATP-Kavach and Loco iATP-Kavach. - Describe the process through which Loco iATP-Kavach units installed in the locomotive determine the location of trains by reading pre-programmed RFID Tag data using the RFID reader. - Explain the importance of ensuring the RFID fixing arrangement is strong enough to withstand impact during normal ballast unloading. - Explain the importance of testing the RFID tags for correct functioning before installation. - State the criteria for selecting PSCs for the	- Demonstrate the process of carrying out the relevant tests on RFID tags to ensure they are functioning correctly. - Demonstrate the process of preparing the RFID tag data using the relevant software. - Show how to use the portable RFID reader to read the RFID data and carry out programming of RFID tags using the ShowTags software tool. - Demonstrate the process of installing RFID tags at the centre of PSC sleepers using clamps, fasteners and fixing arrangements. - Demonstrate the process of conducting the relevant tests after the installation. - Demonstrate the process of carrying out troubleshooting as per the manufacturer's instructions. - Demonstrate the process of carrying out relevant documentation concerning the work completed, any issues experienced, and the remedial action taken.

installation of RFID tags.
- Explain the use of relevant tools and equipment spanner set and fasteners and RFID Programming Kit.
- Explain the importance of ensuring the RFID fixing arrangement on PSC sleepers adhere to the recommended dimensions.
- List the relevant tests to be conducted to ensure the correct functioning of RFID tags.
- Explain the importance of identifying and resolving the recurring issues.

Classroom Aids

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

Tools, Equipment and Other Requirements

RFID Tags, RFID Frame, Protective Enclosure, Drilling Machine, Spanner Set & Fasteners, RFID Programming Kit

Module 10: Install SDH, DWDM, L2 and L3 Equipment
Mapped to TEL/N6300 v2.0

Terminal Outcomes:

- Prepare for installation.
- Connect power and traffic cable to the equipment.
- Record and report.

Duration: 03:00	Duration: 12:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Identify the category to which the equipment belongs. - Discuss the critical punch points as per the site installation checklist. - List additional equipment required for the installation. - Explain the risks involved in not following the standard operation procedure. - Discuss the importance of the dimension of the equipment to be installed as per installation guide. - Identify the appropriate electrical cables and optical cords to be used. - Explain the usage of cable and cable accessories along with the login cables. - Explain the need, requirement and the process of earthing and maintaining the earthing pit to zero. - Discuss the various precautions to be followed to avoid any damage to the cables and the connectors. - Explain the format of the installation report to be completed after the installation process. - Explain the process for obtaining sign-off from all concerned parties after the completion of the installation activities. - List the types of documents to be maintained w.r.t inspection.	- Check availability of all parts and installation kits/racks needed for installation physically and against the bill of material. - Obtain the installation plan from planning team, understand it and suggest changes to it based on viability of installation. - Demonstrate how to properly order/sequence the equipment to be installed in the rack and maintain appropriate space for cables. - Demonstrate how to identify the MCB to be used and check its specification and connectivity. - Check the connection and routing of the power and traffic cables as well as mark the cables accordingly while following the necessary precautions. - Report about the installation progress to the supervisor. - Obtain sign-off from all concerned parties after the completion of the installation. - Fill out formats/checklists after installation of equipment.
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
SDH, L2, L3 and DWDM system, Test equipment, line tester, Ethernet tester, VSWR meter, RF power meter, Optical meter, login cables (RJ45, RS232 and Hi –Speed USB), DWDM amplifiers, MDU units, RODAM, transmission media – Optical, Electrical, cable connectors, cable ties and cable tray, Ethernet network	

Module 11: Perform commissioning of SDH, DWDM, L2 and L3 Equipment
Mapped to TEL/N6302 v2.0

Terminal Outcomes:

- Assess network topology to develop commissioning plan and test procedure.
- Configure the installed equipment.
- Report and record the test effectiveness of the installed equipment.

Duration: 03:00	Duration: 12:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Explain the architecture and protocol of different types of networks such as LAN, WAN etc. - Discuss the design and application of the equipment for which commissioning is to be done. - Explain the network topology, features, functioning associated with SDH, LAN, WAN equipment along with its advantages and disadvantages. - Explain the IP protocols being used along with the network concepts. - Explain the working and functionality of Ethernet, media and connector etc. - List the various administrative jobs that need to be carried out post testing activities. - List the types of records and documents to be updated w.r.t inspection and result of not maintaining the same.	- Employ appropriate techniques to ensure availability of the equipment. - Prepare, record and save commissioning plan for the equipment. - Demonstrate the process to check for power connectivity and switch on the power. - Perform configuration of the equipment as per the commissioning guide and verify against the configuration checklist. - Test the equipment by making use of test cases. - Prepare and update the test report based on the test result. - Perform administrative jobs like site clearance, return of test equipment etc. - Maintain, update and ensure the availability of records/ documents related to testing of equipment to all the concerned people.
Classroom Aids	
Whiteboard and Markers, Chart paper and sketch pens, LCD Projector and Laptop for presentations	
Tools, Equipment and Other Requirements	
SDH, L2, L3 and DWDM system, Test equipment, line tester, Ethernet tester, VSWR meter, RF power meter, Optical meter, login cables (RJ45, RS232 and Hi –Speed USB), DWDM amplifiers, MDU units, RODAM, transmission media – Optical, Electrical, cable connectors, cable ties and cable tray, Ethernet network	

Module 12: On-the-Job Training
Mapped to TEL/Q6304 v1.0

Mandatory Duration: 180:00	Recommended Duration: 00:00

Location: On-Site

Terminal Outcomes

1. Verify post rework/ re-soldering.

2. Demonstrate use of cleaning chemicals/solvents for PCBs.

3. Demonstrate use of vapour de-freezer equipment for PCB cleaning.

4. Illustrate basics of optical fiber manufacturing and construction

5. Demonstrate the optical fiber light transmission basics

6. Demonstrate the working principles of multi-mode and single mode fibers

6. Knowledge of optical fiber characteristics like refraction, polarization, attenuation, dispersion

7. Bands in optical fiber and their usability, loss characteristics

8. Signal strength and quality kpis – design values and margins

9. Functionality of optical equipment like cleaver, mechanical and fusion splicing kit, protection sleeves, fiber stripper, fiber reinforced plaster during splicing and jointing

10. Basic knowledge of electrical and electronic components

11. Fiber handling practices (bend radius)

12. VLF (Visual Fault Locator) principal and testing features

13. Importance and use of fiber pulling tools/equipment (fish tape)

14. Importance and relevance of managing cable slack and cable management

15.Demonstrate how to install different types of cables, wires and connectors.

16. Perform splicing, crimping, soldering of cables, and connectorisation.

17. Check indoor and outdoor cable routes.

18. Inspect the site thoroughly for the viability of cable installation and other tasks

19. Explain the organizational procedure to obtain sign-off from all the relevant parties

20. Demonstrate the steps to check the working and status of site alarm

21. Maintain and update maintenance documents to be approved by higher authorities

22. Erect and secure telecom structures, such as steel towers, monopoles, masts and cable tray installations to facilitate the installation of telecom equipment.

23. Install antennas, feeders, microwave dishes, mast head amplifiers and ancillary equipment on steel structures/ monopoles/ towers, using the appropriate safety equipment to ensure safety at heights.

24. Carry out the installation of feeder cables, high jumpers, Tower Mounted Amplifier (TMA), Call Distribution Unit (CDU), Radio Frequency (RF) antenna system and external RF hardware installation, such as RRUs.

25. Explain the importance, functioning and various features of the Indigenous Automatic Train Protection System (iATP).

26. Explain the functions of key system components of iATP-Kavach, i.e., Loco iATP-Kavach, Loco Pilot – OCIP, Brake Interface Unit, RFID Reader, Station iATP-Kavach, Radio Tower, Station Master – OCIP.

27. Carry out the relevant tests on RFID tags to ensure they are functioning correctly.

28. Prepare the RFID tag data using the relevant software.

29. Use portable RFID reader to read the RFID data and carry out programming of RFID tags using the ShowTags software tool.

30. Install RFID tags at the centre of PSC sleepers using clamps, fasteners and fixing arrangements.

31. Conduct the relevant tests after the installation.

32. Carry out troubleshooting as per the manufacturer's instructions.

33. Carry out relevant documentation concerning the work completed, any issues experienced, and the remedial action taken.

34. Discoverthe MCB to be used and check its specification and connectivity.

35. Check the connection and routing of the power and traffic cables.

36. Record details in formats/checklists after installation of equipment.

37. Prepare an acceptance and maintenance test plan.

38. Check for power connectivity and switch on the power.

39. Configure the equipment as per the acceptance test plan and verify against the configuration checklist.

40. Label the port numbers after arranging the stickers.

Module 13: DGT/VSQ/N0102 Employability Skills (60 hours)
Mapped to Technician - Automatic Train Protection System (ATPS)

Mandatory Duration: *60:00*

Location: On-Site

S.No.	Module Name	Key Learning Outcomes	Duration (hours)
1.	Introduction to Employability Skills	• Discuss the Employability Skills required for jobs in various industries. • List different learning and employability related GOI and private portals and their usage.	1.5
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. • Show how to practice different environmentally sustainable practices.	1.5
3.	Becoming a Professional in the 21st Century	• Discuss importance of relevant 21st century skills. • Exhibit 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. • Describe the benefits of continuous learning.	2.5
4.	Basic English Skills	• Show how to use basic English sentences for every day. conversation in different contexts, in person and over the telephone. • Read and interpret text written in basic English • Write a short note/paragraph / letter/e -mail using basic English.	10
5.	Career Development & Goal Setting	• Create a career development plan with well-defined short- and long-term goals.	2
6.	Communication Skills	• Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette. • Explain the importance of active listening for effective communication. • Discuss the significance of working collaboratively with others in a team.	5
7.	Diversity & Inclusion	• Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD. • Discuss the significance of escalating sexual harassment issues as per POSH act.	2.5
8.	Financial and Legal Literacy	• Outline the importance of selecting the right financial institution, product, and service. • Demonstrate how to carry out offline and online financial transactions, safely and securely. • List the common components of salary and compute income, expenditure, taxes, investments etc. • Discuss the legal rights, laws, and aids.	5
9.	Essential Digital	• Describe the role of digital technology in today's life.	10

	Skills	• Demonstrate how to operate digital devices and use the associated applications and features, safely and securely. • Discuss the significance of displaying responsible online behavior while browsing, using various social media platforms, e-mails, etc., safely and securely. • Create sample word documents, excel sheets and presentations using basic features. • Utilize virtual collaboration tools to work effectively.	
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
11	Customer Service	• Describe the significance of analyzing different types and needs of customers. • Explain the significance of identifying customer needs and responding to them in a professional manner. • Discuss the significance of maintaining hygiene and dressing appropriately.	5
12	Getting Ready for Apprenticeship & Jobs	• Create a professional Curriculum Vitae (CV). • Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively. • Discuss the significance of maintaining hygiene and confidence during an interview. • Perform a mock interview. • List the steps for searching and registering for apprenticeship opportunities.	8

LIST OF TOOLS & EQUIPMENT FOR EMPLOYABILITY SKILLS		
S 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.		

Trainer Requirements
(*Technician - Automatic Train Protection System (ATPS)*)

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	*Specialization*	*Years*	*Specialization*	
Graduate	Science/Electronics /Telecom and other relevant fields	1	Technician – ATPS	0	NA	Eligible for ToT program

Trainer Certification	
Domain Certification	**Platform Certification**
Certified in Job Role "**Technician – ATPS**", mapped to QP: "**TEL/Q6304, v2.0**", Minimum accepted score is **80%.**	Certified in Job Role: "**Trainer (VET and Skills)**", mapped to the QP: "**MEP/Q2601, v2.0**". Minimum accepted score is **80%**

Assessor Requirements (Technician - Automatic Train Protection System (ATPS)

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	*Specialization*	*Years*	*Specialization*	
Graduate	Science/Electronics /Telecom and other relevant fields	1	Technician – ATPS	0	NA	Eligible for ToA program

Assessor Certification	
Domain Certification	**Platform Certification**
Certified in Job Role "**Technician – ATPS**", mapped to QP: "**TEL/Q6304, v2.0**", Minimum accepted score is **80%.**	Certified in Job Role: "**Assessor (VET and Skills)**", mapped to the QP: "**MEP/Q2701, v2.0**". Minimum accepted score is **80%.**

Trainer Requirements (Employability Skills 60 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:
Current ITI trainers	Employability Skills Training (3 days full-time course done between 2019-2022)					• have good communication skills
Certified current EEE trainers (155 hours)	from Management SSC (MEPSC)					• be well versed in English • have digital skills • have attention to detail • be adaptable
Certified Trainer	Qualification Pack: Trainer (MEP/Q0102)					• have willingness to learn

Trainer Certification	
Domain Certification	**Platform Certification**
Certified in 60-hour Employability NOS (2022), with a minimum score of 80% OR Certified in 120-, 90-hour Employability NOS (2022), with a minimum score of 80%	NA

Master Trainer Requirements (Employability Skills 60 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 Master trainer should: • have good communication skills • be well versed in English • have basic 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)	

Master Trainer Certification	
Domain Certification	**Platform Certification**
Certified in 60-hour Employability NOS (2022), with a minimum score of **90%.** **OR** Certified in 120-, 90-hour Employability NOS (2022), with a minimum score of **90%**	NA

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.
- A 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 60 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	The 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 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
ES	Employability Skills