

Qualification Pack



Technical Supervisor - Automatic Train Protection System (ATPS)

QP Code: TEL/Q6303

Version: 2.0

NSQF Level: 5

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

Qualification Pack

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TEL/Q6303: Technical Supervisor - Automatic Train Protection System (ATPS)

Brief Job Description

A Technical Supervisor is responsible for carrying out various activities, such as planning and supervising the installation of stationary iATP - Kavach (indigenous Automatic Train Protection System), Loco iATP, and iATP systems and sub-systems, e.g. Radio Frequency Identification (RFID) Tags and readers. The individual is also responsible for soil testing and foundation of railway telecom towers, testing and maintenance of iATP systems and sub-systems, including fault localisation and troubleshooting. They are also responsible for OFC cable laying, jointing/splicing, termination, testing and documentation of the OFC cable plant. They also supervises a team of technicians and workers.

Personal Attributes

The individual must be physically fit to work for long duration. The individual must have attention to detail and problem-solving skills. They should be able to work in coordination with others and communicate appropriately, both verbally and in writing.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. [TEL/N2500: High density hand soldering of components on telecom boards](#)
2. [TEL/N4126: Handle fiber Constructs, Performance and Selection Criteria](#)
3. [TEL/N4200: Installation of passive FTTH/X components](#)
4. [TEL/N6238: Tower Site Performance Measurement and Parameter Recording](#)
5. [TEL/N6239: Tower Site Data Analysis and Reporting](#)
6. [TEL/N6240: Tower Site Optimization and Troubleshooting](#)
7. [TEL/N6315: Lay Wiring for Locomotives and Perform Testing](#)
8. [TEL/N6312: Plan and Supervise the Installation of RFID tags and Readers](#)
9. [TEL/N4118: Tower/Bay Installation Mechanical](#)
10. [TEL/N4119: Tower/Bay installation Electrical](#)
11. [TEL/N6313: Carry out the testing and troubleshooting of iATP sub-systems](#)
12. [TEL/N6314: Set up, simulate and test the Station and Loco Kavach](#)

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13. [TEL/N6307: Provisioning of Active Network Equipment](#)

14. [DGT/VSQ/N0102: Employability Skills \(60 Hours\)](#)

Qualification Pack (QP) Parameters

Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Project Engineering
Country	India
NSQF Level	5
Credits	20
Aligned to NCO/ISCO/ISIC Code	NCO-2015/NIL
Minimum Educational Qualification & Experience	<p>Completed 2nd year of UG (UG Diploma) (of 3-year/ 4-years UG) OR Pursuing 2nd year of UG (Pursuing 2nd year of 3-year/ 4-years UG and continuing education) OR Completed 2nd year diploma after 12th OR Pursuing 2nd year of 2-year diploma after 12th (with no experience required) OR Previous relevant Qualification of NSQF Level (4) with 3 Years of experience</p>
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	21 Years
Last Reviewed On	NA
Next Review Date	26/05/2025
NSQC Approval Date	26/05/2022
Version	2.0



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Reference code on NQR	QG-05-TL-00462-2023-V1.1-TSSC
NQR Version	1.1

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TEL/N2500: High density hand soldering of components on telecom boards

Description

This OS unit is about skills required to undertake high density hand soldering of components on telecom boards.

Scope

The scope covers the following :

- Prepare board and material/components
- Soldering of components on boards

Elements and Performance Criteria

Prepare board and material/components

To be competent, the user/individual on the job must be able to:

- PC1.** analyse Computer-aided Design (CAD) specifications
- PC2.** set the soldering jig/fixture as per the work specifications
- PC3.** gather all components to be soldered as per the specifications
- PC4.** set the temperature as per the work and component specifications and measure the same using sensors
- PC5.** select the correct solder bit and soldering wire for the given work
- PC6.** clean solder bits, component leads and boards of any contamination
- PC7.** clean the solder wire of any contamination
- PC8.** select the correct flux as per specifications

Soldering of Components on Boards

To be competent, the user/individual on the job must be able to:

- PC9.** undertake correct placement and orientation of components
- PC10.** demonstrate amount of solder feeding application, sufficient flux addition, correct positioning and vector speed of nozzle, no solder on gold plated while holding the equipment
- PC11.** regulate soldering temperature throughout the process to maintain consistency
- PC12.** maintain solder stations as per the start and stop procedure

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** risk and impact of not following defined procedures/work instructions and timeline
- KU2.** escalation matrix for reporting identified incidents, troubles and/or emergencies
- KU3.** records to be maintained and implications of non-maintenance of the same

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- KU4.** Safety Health and Environment (SHE) and Occupational Health and Safety (OHS) guidelines and regulations as per company norms
- KU5.** impact of contamination of Printed Circuit Boards (PCBs), components and soldering material
- KU6.** cleaning procedures and processes
- KU7.** operational characteristics of soldering stations
- KU8.** impact of temperature and humidity on the process
- KU9.** process of CAD diagram preparation, soldering, component placement specifications

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** read and interpret necessary documents
- GS2.** read and understand manuals, requirement documents, operational health and safety instructions, memos, reports etc.
- GS3.** read and comprehend/understand material specifications
- GS4.** communicate with colleagues, peers and supervisor
- GS5.** liaise and coordinate with third party vendors/other stakeholders

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare board and material/components</i>	16	31	-	13
PC1. analyse Computer-aided Design (CAD) specifications	2	3	-	2
PC2. set the soldering jig/fixture as per the work specifications	2	4	-	2
PC3. gather all components to be soldered as per the specifications	2	4	-	2
PC4. set the temperature as per the work and component specifications and measure the same using sensors	2	5	-	2
PC5. select the correct solder bit and soldering wire for the given work	2	5	-	2
PC6. clean solder bits, component leads and boards of any contamination	2	4	-	1
PC7. clean the solder wire of any contamination	2	3	-	1
PC8. select the correct flux as per specifications	2	3	-	1
<i>Soldering of Components on Boards</i>	9	24	-	7
PC9. undertake correct placement and orientation of components	1	5	-	1
PC10. demonstrate amount of solder feeding application, sufficient flux addition, correct positioning and vector speed of nozzle, no solder on gold plated while holding the equipment	4	8	-	2
PC11. regulate soldering temperature throughout the process to maintain consistency	2	6	-	2
PC12. maintain solder stations as per the start and stop procedure	2	5	-	2
NOS Total	25	55	-	20

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National Occupational Standards (NOS) Parameters

NOS Code	TEL/N2500
NOS Name	High density hand soldering of components on telecom boards
Sector	Telecom
Sub-Sector	Handset
Occupation	Communication Electronics
NSQF Level	4
Credits	1
Version	4.0
Last Reviewed Date	NA
Next Review Date	26/05/2025
NSQC Clearance Date	26/05/2022

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TEL/N4126: Handle fiber Constructs, Performance and Selection Criteria

Description

This OS unit is about identifying and working with various fiber types, understanding specifications of passive components like Fiber Distribution Management System (FDMS), joint enclosure, patch chords, pigtailed, 0dB adapters, attenuators etc. and comply with use/deployment parameters.

Scope

The scope covers the following :

- Carry out Optical Fiber construction and transmission checks
- Identify fiber performance parameters
- Install suitable fiber types and identifiers
- Cable selection criteria

Elements and Performance Criteria

Carry out Optical Fiber construction and transmission checks

To be competent, the user/individual on the job must be able to:

- PC1.** identify fiber cable construct (core, clad, buffer coating)
- PC2.** identify various cable components (fibers, strength members, jackets)
- PC3.** identify and work with strengthening members, rip cords and armored fibers
- PC4.** perform transmission checks for various types of fiber identified (multimode or single mode)

Identify fiber performance parameters

To be competent, the user/individual on the job must be able to:

- PC5.** identify key performance parameters for an optical fiber (attenuation, fiber size and bandwidth)
- PC6.** gauge performance by reading characteristic chart/parameters
- PC7.** identify causes of attenuation (scattering, absorption, fiber bending radius and bending losses)
- PC8.** differentiate between speed and bandwidth
- PC9.** correlate between attenuation and wavelength

Identify suitable fiber types and identifiers

To be competent, the user/individual on the job must be able to:

- PC10.** identify and differentiate various fiber types as per their construction (zip cord, distribution, loose tube, breakout)
- PC11.** identify and differentiate various fiber types as per use (armored, aerial, direct burial, underwater)
- PC12.** deploy suitable fiber type based on deployment and its characteristics
- PC13.** identify cables as per the standard color codes

Cable selection criteria

To be competent, the user/individual on the job must be able to:

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- PC14.** select appropriate cable as per the criteria - pulling strength, water protection, rodent penetration
- PC15.** demonstrate grounding and bonding for armored cables

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the implication of induced potential and electrical hazards related to Electrical Traction Supply
- KU2.** risk and impact of not following defined procedures/work instructions
- KU3.** escalation matrix for reporting identified incidents, troubleshooting and/or emergencies, e.g. system failures, fire and power failures
- KU4.** Safety Health and Environment (SHE) and Occupational Health and Safety (OHS) guidelines and regulations as per company norms
- KU5.** optical fiber as communication medium
- KU6.** basics of optical fiber manufacturing and construction
- KU7.** optical fiber light transmission basics
- KU8.** cause and effect of reflection and dispersion (modal, chromatic, polarization)
- KU9.** relevance of cut-off wavelength
- KU10.** types of fibers based on core structure - multi-mode and single mode fibers
- KU11.** optical fiber performance parameters and selection criteria
- KU12.** optical fiber specifications

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** write system concepts and flows
- GS2.** maintain records and process documents
- GS3.** read and comprehend technical literature/parameters/performance graphs
- GS4.** read manuals, health and safety Instructions, memos, reports etc.
- GS5.** communicate with colleagues, peers and customers/stakeholders
- GS6.** liaise and coordinate with third party vendors or other stakeholders
- GS7.** plan and organize the work to achieve compliances and results
- GS8.** read customer interaction protocol

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Carry out Optical Fiber construction and transmission checks</i>	8	16	-	7
PC1. identify fiber cable construct (core, clad, buffer coating)	2	4	-	1
PC2. identify various cable components (fibers, strength members, jackets)	2	4	-	2
PC3. identify and work with strengthening members, rip cords and armored fibers	2	4	-	2
PC4. perform transmission checks for various types of fiber identified (multimode or single mode)	2	4	-	2
<i>Identify fiber performance parameters</i>	10	15	-	5
PC5. identify key performance parameters for an optical fiber (attenuation, fiber size and bandwidth)	2	4	-	1
PC6. gauge performance by reading characteristic chart/parameters	2	4	-	1
PC7. identify causes of attenuation (scattering, absorption, fiber bending radius and bending losses)	2	2	-	1
PC8. differentiate between speed and bandwidth	2	3	-	1
PC9. correlate between attenuation and wavelength	2	2	-	1
<i>Identify suitable fiber types and identifiers</i>	8	14	-	6
PC10. identify and differentiate various fiber types as per their construction (zip cord, distribution, loose tube, breakout)	2	3	-	2
PC11. identify and differentiate various fiber types as per use (armored, aerial, direct burial, underwater)	2	4	-	2
PC12. deploy suitable fiber type based on deployment and its characteristics	2	4	-	1

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. identify cables as per the standard color codes	2	3	-	1
<i>Cable selection criteria</i>	4	5	-	2
PC14. select appropriate cable as per the criteria - pulling strength, water protection, rodent penetration	2	3	-	1
PC15. demonstrate grounding and bonding for armored cables	2	2	-	1
NOS Total	30	50	-	20

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National Occupational Standards (NOS) Parameters

NOS Code	TEL/N4126
NOS Name	Handle fiber Constructs, Performance and Selection Criteria
Sector	Telecom
Sub-Sector	Passive Infrastructure
Occupation	Operations and Maintenance - Passive Infrastructure
NSQF Level	5
Credits	1
Version	4.0
Last Reviewed Date	NA
Next Review Date	26/05/2025
NSQC Clearance Date	26/05/2022

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TEL/N4200: Installation of passive FTTH/X components

Description

This OS unit is about installation of passive FTTH/X components like splitters and undertaking basic installation checks.

Scope

The scope covers the following :

- Installation of passive FTTH/X components (Splitter)
- Perform terminal connections (single incoming/multiple outgoing)
- Undertake power test

Elements and Performance Criteria

Installation of passive FTTH/X components (Splitter)

To be competent, the user/individual on the job must be able to:

- PC1.** identify components of passive devices (splitters)
- PC2.** demonstrate installation practices for wall mount splitters (1x8, 1x16, 1x32)
- PC3.** identify feeder and distribution ports on the devices

Perform terminal connections (single incoming/multiple outgoing)

To be competent, the user/individual on the job must be able to:

- PC4.** identify feeder and distribution cables/pigtails
- PC5.** demonstrate feeder and distribution connections

Undertake power test

To be competent, the user/individual on the job must be able to:

- PC6.** demonstrate insertion loss testing of optical splitters (olts and light source)
- PC7.** demonstrate power output measurement at output port by use of power meter and light source (using olts & light source)

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** risk and impact of not following defined procedures/work instructions
- KU2.** escalation matrix for reporting identified incidents, troubles and/or emergencies e.g. system failures, fire and power failures
- KU3.** types of documentation in organization and importance of the same
- KU4.** records to be maintained and implications of non-maintenance of the same
- KU5.** spare management and repair and return process for faulty equipment
- KU6.** Safety Health and Environment (SHE) and Occupational Health and Safety (OHS) guidelines and regulations as per company norms

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- KU7.** passive network components and their deployment environment
- KU8.** principle of operation of optical splitters
- KU9.** concept of feeder and distribution connections in a splitter
- KU10.** types of optical splitters and relative features/limitations

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** fill up standard technical forms and activity logs
- GS2.** maintain records and process documents
- GS3.** read and comprehend technical literature/parameters/performance graphs
- GS4.** read manuals, health and safety Instructions, memos, reports etc.
- GS5.** communicate with colleagues, peers and customers/stakeholders
- GS6.** liaise and coordinate with third party vendors or other stakeholders
- GS7.** plan and organize the work to achieve compliances and results
- GS8.** read customer interaction protocol

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Installation of passive FTTH/X components (Splitter)</i>	16	21	-	4
PC1. identify components of passive devices (splitters)	5	5	-	1
PC2. demonstrate installation practices for wall mount splitters (1x8, 1x16, 1x32)	7	8	-	2
PC3. identify feeder and distribution ports on the devices	4	8	-	1
<i>Perform terminal connections (single incoming/multiple outgoing)</i>	10	14	-	2
PC4. identify feeder and distribution cables/pigtails	5	6	-	1
PC5. demonstrate feeder and distribution connections	5	8	-	1
<i>Undertake power test</i>	9	20	-	4
PC6. demonstrate insertion loss testing of optical splitters (olts and light source)	5	9	-	2
PC7. demonstrate power output measurement at output port by use of power meter and light source (using olts & light source)	4	11	-	2
NOS Total	35	55	-	10

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National Occupational Standards (NOS) Parameters

NOS Code	TEL/N4200
NOS Name	Installation of passive FTTH/X components
Sector	Telecom
Sub-Sector	Passive Infrastructure
Occupation	Network (Passive) Installation
NSQF Level	3
Credits	1
Version	5.0
Last Reviewed Date	NA
Next Review Date	26/05/2025
NSQF Clearance Date	26/05/2022

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TEL/N6238: Tower Site Performance Measurement and Parameter Recording

Description

This OS unit is about the on-site activities for measuring tower performance and recording parameters for analysis.

Scope

The scope covers the following :

- Plan area, routes and schedule to conduct drive test
- Onsite activity
- Fault identification and rectification

Elements and Performance Criteria

Plan area, routes and schedule for conducting drive test

To be competent, the user/individual on the job must be able to:

- PC1.** trace a given path on the google earth software, MapInfo software to identify the site location
- PC2.** coordinate with the support team to schedule the drive test
- PC3.** plan the drive test route
- PC4.** check/rectify the fault, site alarm (if any) before initiating the drive test

On-site activity

To be competent, the user/individual on the job must be able to:

- PC5.** demonstrate test compliances (no swap in the sector, all neighboring cell parameters are defined and all Radio Frequencies (RFs) given are correct as per company norms)
- PC6.** demonstrate recording of drive test log (dropped calls, blocked calls, handover failures, ta, clock-wise, anti-clockwise handover and inter-connectivity between 5G/VoLTE/UMTS/GSM technology)
- PC7.** undertake basic analysis of the report generated by Layer 2 and Layer 3 during the drive test/post drive test
- PC8.** demonstrate the process of creating log files (short call and long call per sector of a site)
- PC9.** re-check the log files before leaving the site

Fault identification and rectification

To be competent, the user/individual on the job must be able to:

- PC10.** identify the nature of fault (due to active or passive components at the tower site)
- PC11.** coordinate with infra engineer/technicians for rectification and cater overall site performance
- PC12.** undertake Root Cause Analysis (RCA) with backend team for dropped/blocked calls/handover failure

Knowledge and Understanding (KU)

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The individual on the job needs to know and understand:

- KU1.** risk and impact of not following defined procedures/work instructions
- KU2.** relevance of records maintenance and implications of non-maintenance of the same
- KU3.** spare management process and repair and return procedure for faulty equipment
- KU4.** relevance of Remote Electrical Tilt (RET)
- KU5.** Safety Health and Environment (SHE) and Occupational Health and Safety (OHS) guidelines and regulations as per company norms
- KU6.** first aid requirements in case of electrical shocks, cuts, fall from height and other common injuries
- KU7.** use of safety kit for climbing towers while optimizing the site
- KU8.** use of fire extinguisher in the vehicle
- KU9.** troubleshooting technique for laptop, GPS, mobile phone, software, dongle
- KU10.** principle of directional antennas, sectorization, tilting (Electrical/Mechanical), frequency bands, GSM architecture
- KU11.** basic fundamentals of eNodeB, GSM, UMTS, VoLTE network elements
- KU12.** functionality and operations of Base Transceiver Station (BTS)
- KU13.** types of antennas and its radiation pattern
- KU14.** basic concepts of handovers, frequency reuse, scrambling codes, GSM channels, UMTS and LTE channels, interference, types of interferences, signal strength, power, units conversion
- KU15.** reasons of call drop, handover failure, poor network coverage issue, swapping

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** fill up appropriate forms, maintain proper records as per given format
- GS2.** read and comprehend manuals, work orders and reports etc.
- GS3.** communicate with supervisor and peers
- GS4.** handle multiple tasks and complete them successfully within due timelines
- GS5.** use and maintain resources efficiently and effectively
- GS6.** effectively resolve disputes and manage disagreements
- GS7.** take initiatives and progressively assume increased responsibilities
- GS8.** create and maintain effective working relationships with subordinate and other team members

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Plan area, routes and schedule for conducting drive test</i>	13	18	-	10
PC1. trace a given path on the google earth software, MapInfo software to identify the site location	4	5	-	3
PC2. coordinate with the support team to schedule the drive test	2	4	-	3
PC3. plan the drive test route	4	5	-	2
PC4. check/rectify the fault, site alarm (if any) before initiating the drive test	3	4	-	2
<i>On-site activity</i>	14	23	-	7
PC5. demonstrate test compliances (no swap in the sector, all neighboring cell parameters are defined and all Radio Frequencies (RFs) given are correct as per company norms)	5	7	-	2
PC6. demonstrate recording of drive test log (dropped calls, blocked calls, handover failures, ta, clock-wise, anti-clockwise handover and inter-connectivity between 5G/VoLTE/UMTS/GSM technology)	4	7	-	2
PC7. undertake basic analysis of the report generated by Layer 2 and Layer 3 during the drive test/post drive test	3	5	-	1
PC8. demonstrate the process of creating log files (short call and long call per sector of a site)	1	2	-	1
PC9. re-check the log files before leaving the site	1	2	-	1
<i>Fault identification and rectification</i>	3	9	-	3
PC10. identify the nature of fault (due to active or passive components at the tower site)	1	3	-	1
PC11. coordinate with infra engineer/technicians for rectification and cater overall site performance	1	3	-	1

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. undertake Root Cause Analysis (RCA) with backend team for dropped/blocked calls/handover failure	1	3	-	1
NOS Total	30	50	-	20

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National Occupational Standards (NOS) Parameters

NOS Code	TEL/N6238
NOS Name	Tower Site Performance Measurement and Parameter Recording
Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Network Operation and Maintenance
NSQF Level	5
Credits	1
Version	4.0
Last Reviewed Date	NA
Next Review Date	26/05/2025
NSQF Clearance Date	26/05/2022

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TEL/N6239: Tower Site Data Analysis and Reporting

Description

This OS unit is about analysing various parameters of the site with the help of recorded log and reports.

Scope

The scope covers the following :

- Analyze drive test reports
- Report and document the network status

Elements and Performance Criteria

Analyze drive test report

To be competent, the user/individual on the job must be able to:

- PC1.** analyse all the parameters related to drive test for 5G and legacy networks (Rx level, Rx quality, C/I, SQI, UL/DL throughput)
- PC2.** analyse all parameters related to drive test for 5G and legacy networks (RSCP, RSSI, SC, CQI, UL/DL throughput, RSRP, RSRQ, PCI, SINR, MO/MT, AT/DT, ping testing)
- PC3.** analyse key site parameters (network coverage analysis, overshooting analysis, pollution analysis, neighbour site analysis, call drop analysis, delay analysis and network KPI analysis)

Reporting and documenting the status

To be competent, the user/individual on the job must be able to:

- PC4.** record faults and take corrective actions
- PC5.** fill all the required details in drive test report template
- PC6.** generate performance report (covering vector map, cell site details, export of recorded log files)

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** risk and impact of not following defined procedures/work instructions
- KU2.** data analysis and corrective action policy and procedures
- KU3.** record keeping policy
- KU4.** work safety policy
- KU5.** telecom technology (5G and legacy network)
- KU6.** types of antennas and coverage pattern
- KU7.** effect of various parameters on antenna coverage
- KU8.** types and reasons for faults and corrective measures
- KU9.** technical documentation



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Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** fill up appropriate forms, maintain proper records as per given format
- GS2.** read and comprehend manuals, work orders, health and safety instructions, reports etc.
- GS3.** communicate with supervisor and peers
- GS4.** handle multiple tasks and complete them successfully within due timelines
- GS5.** use and maintain resources efficiently and effectively
- GS6.** take initiatives and progressively assume increased responsibilities
- GS7.** create and maintain effective working relationships with subordinate and other team members

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Analyze drive test report</i>	15	31	-	12
PC1. analyse all the parameters related to drive test for 5G and legacy networks (Rx level, Rx quality, C/I, SQI, UL/DL throughput)	5	9	-	4
PC2. analyse all parameters related to drive test for 5G and legacy networks (RSCP, RSSI, SC, CQI, UL/DL throughput, RSRP, RSRQ, PCI, SINR, MO/MT, AT/DT, ping testing)	5	10	-	4
PC3. analyse key site parameters (network coverage analysis, overshooting analysis, pollution analysis, neighbour site analysis, call drop analysis, delay analysis and network KPI analysis)	5	12	-	4
<i>Reporting and documenting the status</i>	15	19	-	8
PC4. record faults and take corrective actions	5	7	-	3
PC5. fill all the required details in drive test report template	5	5	-	2
PC6. generate performance report (covering vector map, cell site details, export of recorded log files)	5	7	-	3
NOS Total	30	50	-	20

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National Occupational Standards (NOS) Parameters

NOS Code	TEL/N6239
NOS Name	Tower Site Data Analysis and Reporting
Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Network Operation and Maintenance
NSQF Level	5
Credits	1
Version	4.0
Last Reviewed Date	NA
Next Review Date	26/05/2025
NSQC Clearance Date	26/05/2022

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TEL/N6240: Tower Site Optimization and Troubleshooting

Description

This OS unit is about tower site optimization and troubleshooting to resolve local issues and achieve network Key Performance indicators (KPIs).

Scope

The scope covers the following :

- Coordinate activities for performing physical network optimization and troubleshooting

Elements and Performance Criteria

Coordinate activities for performing physical network optimization and troubleshooting

To be competent, the user/individual on the job must be able to:

- PC1.** coordinate with the technician for site antenna adjustment (azimuths, antenna tilts (Electrical/Mechanical), antenna height and orientation)
- PC2.** undertake network parameter checks (5G and legacy network parameters - BTS, NodeB, eNodeB, transmit power, feature algorithms, frequency hopping)
- PC3.** capture GPS direction and latitude/longitude of any immediate obstructions (tall building, chimney, water tank etc.)
- PC4.** identify the cable/antenna swap (if any) and prepare connectors in case of any fault detected
- PC5.** undertake corrective actions (based on analysis of the local site parameters)

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** risk and impact of not following defined procedures/work instructions
- KU2.** relevance of records maintenance and implications of non-maintenance of the same
- KU3.** spare management and repair and return process
- KU4.** Safety Health and Environment (SHE) and Occupational Health and Safety (OHS) guidelines and regulations as per company norms
- KU5.** first aid requirements in case of electrical shocks, cuts, fall from height and other common injuries
- KU6.** the use of safety kit for climbing towers while optimizing the site
- KU7.** effects of antenna tilt, direction, azimuth and height on network performance equipment (5G and legacy network equipment - BTS, NodeB, eNodeB)
- KU8.** site performance parameters and their optimal values
- KU9.** effects of obstruction on tower site performance
- KU10.** corrective and mitigating actions to improve site performance
- KU11.** operation and troubleshooting of site equipment (GPS, Handset, car charger, dongle, mouse GPS, Data Card)

Qualification Pack

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** fill up appropriate technical forms, maintain proper records as per given format
- GS2.** read and comprehend manuals, work orders, health and safety instructions, reports etc.
- GS3.** communicate with supervisor and peers
- GS4.** handle multiple tasks and complete them successfully within due timelines
- GS5.** use and maintain resources efficiently and effectively
- GS6.** take initiatives and progressively assume increased responsibilities
- GS7.** create and maintain effective working relationships with subordinate and other team members

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Coordinate activities for performing physical network optimization and troubleshooting</i>	30	60	-	10
PC1. coordinate with the technician for site antenna adjustment (azimuths, antenna tilts (Electrical/Mechanical), antenna height and orientation)	6	14	-	2
PC2. undertake network parameter checks (5G and legacy network parameters - BTS, NodeB, eNodeB, transmit power, feature algorithms, frequency hopping)	7	14	-	2
PC3. capture GPS direction and latitude/longitude of any immediate obstructions (tall building, chimney, water tank etc.)	8	12	-	2
PC4. identify the cable/antenna swap (if any) and prepare connectors in case of any fault detected	5	15	-	2
PC5. undertake corrective actions (based on analysis of the local site parameters)	4	5	-	2
NOS Total	30	60	-	10

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N6240
NOS Name	Tower Site Optimization and Troubleshooting
Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Network Operation and Maintenance
NSQF Level	5
Credits	1
Version	4.0
Last Reviewed Date	NA
Next Review Date	26/05/2025
NSQF Clearance Date	26/05/2022

Qualification Pack

TEL/N6315: Lay Wiring for Locomotives and Perform Testing

Description

This OS unit is about laying wires for locomotives as planned and perform EMI/EMC testing.

Scope

The scope covers the following :

- Plan and prepare for RDSO approved Loco fitment wiring and equipment installation
- Carry out testing of the EMC/EMI and unit test cases
- Carry out documentation and review

Elements and Performance Criteria

Plan and prepare for RDSO approved Loco fitment wiring and equipment installation

To be competent, the user/individual on the job must be able to:

- PC1.** determine the scope of work by studying the relevant documents or coordinating with the supervisor
- PC2.** collect work requirements, tools, equipment and materials required for laying of wires
- PC3.** carry out Loco Kavach wiring as per the Loco wiring plan document
- PC4.** examine the installation material to ensure it is not defective or damaged, and get the defective/ damaged material replaced
- PC5.** arrange the relevant Personal Protective Equipment (PPE), and installation material and relevant tools and equipment by coordinating with the supervisor
- PC6.** use Bore Gauge for measurement of internal diameters of End Shield/ Racer during bearing fitment in traction motors for Electric Locomotives
- PC7.** use Dial Snap Gauges for measurement of shaft diameter of traction motor for Electric Locomotives
- PC8.** Magnetic Particle Testing (MPT) of Traction motor (TM) nose stay in conventional locomotives, TM suspension holder support and motor support

Carry out testing of the EMC/EMI and unit test cases

To be competent, the user/individual on the job must be able to:

- PC9.** perform the integration tests and other tests as per the unit test cases
- PC10.** carry out Electromagnetic Interference (EMI) test to determine the source and degree of possible electromagnetic interference to Station and Loco Kavach equipment
- PC11.** carry out Electromagnetic Compatibility (EMC) test to ensure Station and Loco Kavach equipment is able to work efficiently around other devices and elements causing electromagnetic interference

Carry out documentation and review

To be competent, the user/individual on the job must be able to:

- PC12.** carry out relevant documentation with respect to the work completed, any issues experienced and the remedial action taken

Qualification Pack

PC13. identify any recurring issues by reviewing the documentation and coordinate with the relevant personnel to find their permanent solution

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the importance of carrying out Loco Kavach wiring as per the Loco wiring plan document
- KU2.** the process of performing the integration tests and other tests as per the unit test cases
- KU3.** the importance and process of carrying out EMI and EMC tests
- KU4.** different types of block working and telecommunication facilities provided at a station signal
- KU5.** the importance of drawing SIP to scale in metric dimensions

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** maintain work-related notes and records
- GS2.** read the relevant literature to get the latest updates about the field of work
- GS3.** listen attentively to understand the information/ instructions being shared
- GS4.** communicate politely and professionally
- GS5.** plan and prioritise tasks to ensure timely completion
- GS6.** co-ordinate with the co-workers to achieve the work objectives
- GS7.** evaluate all possible solutions to a problem to select the best one
- GS8.** take quick decisions to deal with workplace emergencies/accidents

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Plan and prepare for RDSO approved Loco fitment wiring and equipment installation</i>	15	32	-	8
PC1. determine the scope of work by studying the relevant documents or coordinating with the supervisor	1	3	-	1
PC2. collect work requirements, tools, equipment and materials required for laying of wires	2	3	-	1
PC3. carry out Loco Kavach wiring as per the Loco wiring plan document	2	3	-	1
PC4. examine the installation material to ensure it is not defective or damaged, and get the defective/ damaged material replaced	2	3	-	1
PC5. arrange the relevant Personal Protective Equipment (PPE), and installation material and relevant tools and equipment by coordinating with the supervisor	2	5	-	1
PC6. use Bore Gauge for measurement of internal diameters of End Shield/ Racer during bearing fitment in traction motors for Electric Locomotives	2	5	-	1
PC7. use Dial Snap Gauges for measurement of shaft diameter of traction motor for Electric Locomotives	2	5	-	1
PC8. Magnetic Particle Testing (MPT) of Traction motor (TM) nose stay in conventional locomotives, TM suspension holder support and motor support	2	5	-	1
<i>Carry out testing of the EMC/EMI and unit test cases</i>	6	18	-	3
PC9. perform the integration tests and other tests as per the unit test cases	2	4	-	1
PC10. carry out Electromagnetic Interference (EMI) test to determine the source and degree of possible electromagnetic interference to Station and Loco Kavach equipment	2	7	-	1

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. carry out Electromagnetic Compatibility (EMC) test to ensure Station and Loco Kavach equipment is able to work efficiently around other devices and elements causing electromagnetic interference	2	7	-	1
<i>Carry out documentation and review</i>	4	10	-	4
PC12. carry out relevant documentation with respect to the work completed, any issues experienced and the remedial action taken	2	5	-	2
PC13. identify any recurring issues by reviewing the documentation and coordinate with the relevant personnel to find their permanent solution	2	5	-	2
NOS Total	25	60	-	15

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N6315
NOS Name	Lay Wiring for Locomotives and Perform Testing
Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Project Engineering
NSQF Level	5
Credits	2
Version	2.0
Last Reviewed Date	NA
Next Review Date	26/05/2025
NSQF Clearance Date	26/05/2022

Qualification Pack

TEL/N6312: Plan and Supervise the Installation of RFID tags and Readers

Description

This OS unit is about planning the installation of RFID tags and readers and supervising their installation. This also covers the preparation of relevant documentation and data entry.

Scope

The scope covers the following :

- Plan the installation of RFID tags and readers
- Arrange the required resources
- Manage the RFID tag and reader installation process
- Collect data and carry out documentation

Elements and Performance Criteria

Plan the installation of RFID tags and readers

To be competent, the user/individual on the job must be able to:

- PC1.** determine the project requirements and deliverables by coordinating with the manager or other relevant personnel
- PC2.** prepare a plan for the delivery of the project, estimating the requirement of resources and time required
- PC3.** coordinate with the manager or relevant personnel for the approval of the project delivery plan

Arrange the required resources

To be competent, the user/individual on the job must be able to:

- PC4.** procure the resources required for the delivery of the project, such as RFID tags, readers and accessories, and Personal Protective Equipment (PPE) as per the requirement
- PC5.** examine the installation material to ensure it is not defective or damaged
- PC6.** arrange for the safe handling and storage of the installation material, tools and equipment
- PC7.** ensure the availability of the required number of technicians and workers, and arrange for their training in relevant activities to ensure the quality of work

Manage the RFID tag and reader installation process

To be competent, the user/individual on the job must be able to:

- PC8.** ensure the technicians and other workers use the relevant tools and equipment safely
- PC9.** supervise the use of RFID programming kit and data configuration kits by technicians for stationary indigenous Automatic Train Protection System (iATP - Kavach) and Loco iATP configuration as per the operational requirements and manufacturer instructions
- PC10.** ensure the appropriate Pre-Stressed Concrete (PSC) sleepers are selected as per railway guidelines
- PC11.** check that RFID readers on locomotives and RFID tags on PSC sleepers are installed as per the given specifications and prepared plan
- PC12.** ensure RFID tags are appropriately secured with clamps, fasteners and protective enclosures

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- PC13.** check that safe working practices are followed by technicians and workers to prevent damage to RFID tags and readers,
- PC14.** ensure the use of relevant PPE to avoid any personal injuries to the technicians and workers
- PC15.** instruct the technicians to conduct the relevant tests after installation to ensure RFID tags are readable by RFID readers on locomotives and can function without any issues
- PC16.** ensure troubleshooting is carried out for any issues experienced with RFID tags RFID readers, following the manufacturer's instructions, or are replaced as appropriate
- PC17.** coordinate with the manufacturer to arrange assistance from them for any manufacturing faults with RFID tags

Collect data and carry out documentation

To be competent, the user/individual on the job must be able to:

- PC18.** ensure all the relevant data concerning the RFID installation process is captured in the approved format
- PC19.** coordinate with the relevant personnel to prepare the relevant reports and documents concerning the work completed, any issues experienced, and the remedial action taken

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the iATP project of the Indian Railways
- KU2.** the benefits and functioning of iATP
- KU3.** the benefits of using RFID tags in railway operations to track wagons, locomotives and railway coaches
- KU4.** the limitations of RFID technology and how to overcome them
- KU5.** the use of RFID programming and data configuration kits for stationary iATP and Loco iATP Configuration
- KU6.** the use of relevant tools and equipment
- KU7.** the use of RFID simulator and RFID tag reader
- KU8.** different RFID sub-systems and the process of their testing
- KU9.** the importance and process of recording the relevant data and maintaining the appropriate documentation
- KU10.** how to use an RFID programming kit to program RFID tags

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** maintain work-related notes and records
- GS2.** read the relevant literature to get the latest updates about the field of work
- GS3.** listen attentively to understand the information/ instructions being shared
- GS4.** communicate politely and professionally
- GS5.** plan and prioritise tasks to ensure timely completion
- GS6.** co-ordinate with the co-workers to achieve the work objectives



Qualification Pack

GS7. evaluate all possible solutions to a problem to select the best one

GS8. take quick decisions to deal with workplace emergencies/ accidents

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Plan the installation of RFID tags and readers</i>	6	11	-	3
PC1. determine the project requirements and deliverables by coordinating with the manager or other relevant personnel	3	4	-	1
PC2. prepare a plan for the delivery of the project, estimating the requirement of resources and time required	2	4	-	1
PC3. coordinate with the manager or relevant personnel for the approval of the project delivery plan	1	3	-	1
<i>Arrange the required resources</i>	4	11	-	4
PC4. procure the resources required for the delivery of the project, such as RFID tags, readers and accessories, and Personal Protective Equipment (PPE) as per the requirement	1	4	-	1
PC5. examine the installation material to ensure it is not defective or damaged	1	2	-	1
PC6. arrange for the safe handling and storage of the installation material, tools and equipment	1	2	-	1
PC7. ensure the availability of the required number of technicians and workers, and arrange for their training in relevant activities to ensure the quality of work	1	3	-	1
<i>Manage the RFID tag and reader installation process</i>	17	26	-	10
PC8. ensure the technicians and other workers use the relevant tools and equipment safely	2	2	-	1
PC9. supervise the use of RFID programming kit and data configuration kits by technicians for stationary indigenous Automatic Train Protection System (iATP - Kavach) and Loco iATP configuration as per the operational requirements and manufacturer instructions	2	4	-	1

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. ensure the appropriate Pre-Stressed Concrete (PSC) sleepers are selected as per railway guidelines	2	2	-	1
PC11. check that RFID readers on locomotives and RFID tags on PSC sleepers are installed as per the given specifications and prepared plan	2	4	-	1
PC12. ensure RFID tags are appropriately secured with clamps, fasteners and protective enclosures	2	3	-	1
PC13. check that safe working practices are followed by technicians and workers to prevent damage to RFID tags and readers,	1	3	-	1
PC14. ensure the use of relevant PPE to avoid any personal injuries to the technicians and workers	2	2	-	1
PC15. instruct the technicians to conduct the relevant tests after installation to ensure RFID tags are readable by RFID readers on locomotives and can function without any issues	1	2	-	1
PC16. ensure troubleshooting is carried out for any issues experienced with RFID tags RFID readers, following the manufacturer's instructions, or are replaced as appropriate	2	2	-	1
PC17. coordinate with the manufacturer to arrange assistance from them for any manufacturing faults with RFID tags	1	2	-	1
<i>Collect data and carry out documentation</i>	3	2	-	3
PC18. ensure all the relevant data concerning the RFID installation process is captured in the approved format	2	1	-	1
PC19. coordinate with the relevant personnel to prepare the relevant reports and documents concerning the work completed, any issues experienced, and the remedial action taken	1	1	-	2
NOS Total	30	50	-	20

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N6312
NOS Name	Plan and Supervise the Installation of RFID tags and Readers
Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Project Engineering
NSQF Level	5
Credits	1
Version	2.0
Last Reviewed Date	NA
Next Review Date	26/05/2025
NSQC Clearance Date	26/05/2022

Qualification Pack

TEL/N4118: Tower/Bay Installation Mechanical

Description

This unit is industry standard techniques for interpretation of civil and mechanical drawings for assembly and installation of telecom equipment bays, telecom towers, structure and telecom racks.

Scope

The scope covers the following :

- In order to assemble and install telecom equipment bays, telecom towers, structures, and telecom racks, industry standard techniques for interpreting civil and mechanical drawings are covered in this subject.

Elements and Performance Criteria

Reading of Engineering drawings

To be competent, the user/individual on the job must be able to:

- PC1.** understand design layout of telecom structures.
- PC2.** basic engineering concepts
- PC3.** read civil & mechanical drawings of complex mechanical structures using manual and software driven methods.
- PC4.** use technical drawing software like autocad/ creo 2.0 (for reading drawing)
- PC5.** use software tools like ms office.
- PC6.** use working knowledge of traditionally deployed structures and bays.
- PC7.** read & physically correlate bill of material.

Assembly and Installation

To be competent, the user/individual on the job must be able to:

- PC8.** determine components required for erection and assembly of tower.
- PC9.** obtain materials required (such as components, equipment, tools and other inventory) as per organizational procedures.
- PC10.** ensure that tools, equipment and other devices are in proper working condition and calibrated.
- PC11.** arrange the required hardware tools like combination pliers, spanner, drill machine.
- PC12.** supervise civil foundation and structural works
- PC13.** supervise mechanical assembly and erection works.

Report & Record

To be competent, the user/individual on the job must be able to:

- PC14.** ensure that engineering documents are available to all appropriate authorities to inspect.
- PC15.** ensure that issued inventory items document and work summary are shared with appropriate teams.

Knowledge and Understanding (KU)

Qualification Pack

The individual on the job needs to know and understand:

- KU1.** risk and impact of not following defined procedures/work instructions
- KU2.** relevant legislation, standards, policies, and procedures followed in the company
- KU3.** how to engage with both internal and external specialists for support in order to resolve incidents and service requests
- KU4.** service request procedures, tools, and techniques
- KU5.** protection equipment (anti-static wrist bands, shoes, dress, packaging, and other appropriate insulations) that is required to be used.
- KU6.** first aid requirements in case of electrical shocks, cuts and other common injuries.
- KU7.** basics of civil & mechanical engineering drawing.
- KU8.** basics of mechanical hardware and software tools.
- KU9.** basics of mechanical assembly and associated techniques.
- KU10.** structural basics of telecom systems and devices.
- KU11.** maintain a knowledge-base of the known problems.

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** fill up record sheets clearly, concisely and accurately as per company procedures.
- GS2.** to read, infer and interpret different types of engineering datasheets.
- GS3.** read and understand organizational health and safety instructions
- GS4.** ability to communicate, manages, direct & supervise unskilled and semi-skilled work force for accomplishment of installation project work.
- GS5.** ability to resolve conflict.
- GS6.** ability to translate technical data to simple, layman friendly directives.
- GS7.** make decisions pertaining to the concerned area of work
- GS8.** plan and organize service feedback files/documents
- GS9.** manage relationships with customers who may be stressed, frustrated, confused, or angry
- GS10.** build customer relationships and use customer centric approach
- GS11.** think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s)
- GS12.** deal with clients lacking the technical background to solve the problem on their own
- GS13.** identify immediate or temporary solutions to resolve delays
- GS14.** use the existing data to arrive at specific data points
- GS15.** use the existing data points for improving the call resolution time
- GS16.** use the existing data points to generate required reports for business
- GS17.** apply, analyze, and evaluate the information gathered from observation, experience, reasoning, or communication, as a guide to thought and action

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Reading of Engineering drawings</i>	25	32	-	-
PC1. understand design layout of telecom structures.	5	5	-	-
PC2. basic engineering concepts	3	3	-	-
PC3. read civil & mechanical drawings of complex mechanical structures using manual and software driven methods.	4	6	-	-
PC4. use technical drawing software like autocad/ creo 2.0 (for reading drawing)	2	8	-	-
PC5. use software tools like ms office.	5	3	-	-
PC6. use working knowledge of traditionally deployed structures and bays.	3	2	-	-
PC7. read & physically correlate bill of material.	3	5	-	-
<i>Assembly and Installation</i>	17	16	-	-
PC8. determine components required for erection and assembly of tower.	5	1	-	-
PC9. obtain materials required (such as components, equipment, tools and other inventory) as per organizational procedures.	3	3	-	-
PC10. ensure that tools, equipment and other devices are in proper working condition and calibrated.	3	2	-	-
PC11. arrange the required hardware tools like combination pliers, spanner, drill machine.	2	4	-	-
PC12. supervise civil foundation and structural works	2	3	-	-
PC13. supervise mechanical assembly and erection works.	2	3	-	-
<i>Report & Record</i>	4	6	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. ensure that engineering documents are available to all appropriate authorities to inspect.	2	2	-	-
PC15. ensure that issued inventory items document and work summary are shared with appropriate teams.	2	4	-	-
NOS Total	46	54	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N4118
NOS Name	Tower/Bay Installation Mechanical
Sector	Telecom
Sub-Sector	Passive Infrastructure
Occupation	Operation & Maintenance
NSQF Level	4
Credits	2
Version	2.0
Last Reviewed Date	NA
Next Review Date	26/05/2025
NSQC Clearance Date	26/05/2022

Qualification Pack

TEL/N4119: Tower/Bay installation Electrical

Description

This unit is about dealing with industry standard techniques for reading Electrical drawing sheet and routing of cable/ wiring harness for telecom tower, bay installation.

Scope

The scope covers the following :

- This section covers industry standard techniques for interpreting electrical drawing sheets and routing cable/wiring harness for telecom tower and bay installation.

Elements and Performance Criteria

Reading of engineering drawings

To be competent, the user/individual on the job must be able to:

- PC1.** Read design layout of telecom structures for cable fabrication
- PC2.** Read electrical drawings of complex mechanical structures using manual and software driven methods
- PC3.** Working knowledge of conventionally deployed cable assembly
- PC4.** Understanding graphic symbols used on drawing sheet.
- PC5.** Basic knowledge of fibre-optic cable
- PC6.** Ability to understand diverse electrical diagrams

Assembly and installation

To be competent, the user/individual on the job must be able to:

- PC7.** Arrange the required hardware tools like combination plier, wire cutter, wire stripper, nose pliers etc. for cable assembly
- PC8.** Ensure that tools, equipment's and other devices are in proper working condition and calibrated
- PC9.** Determine components required based on fault installation line.
- PC10.** Supervise cable assembly and wiring harnesses

Report & Record

To be competent, the user/individual on the job must be able to:

- PC11.** Ensure record sheets are completed accurately, as per company guidelines
- PC12.** Retain documents for specific period of time, as per company procedure
- PC13.** Develop the report of assembly work for future inspection

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** risk and impact of not following defined procedures/work instructions

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- KU2.** relevant legislation, standards, policies, and procedures followed in the company
- KU3.** how to engage with both internal and external specialists for support in order to resolve incidents and service requests
- KU4.** service request procedures, tools, and techniques
- KU5.** protection equipment (anti-static wrist bands, shoes, dress, packaging, and other appropriate insulations) that is required to be used.
- KU6.** first aid requirements in case of electrical shocks, cuts .
- KU7.** basics of electrical engineering drawing and its wiring color code.
- KU8.** basics of electrical hardware tools. like nose plier, wire cutter etc
- KU9.** knowledge of numerous electrical diagrams.
- KU10.** acquire knowledge of basic assembly technique of wiring harness.
- KU11.** structural basics of telecom systems and devices.
- KU12.** maintain a knowledge-base of the known problems.
- KU13.** standard fault-finding techniques.

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** fill up record sheets clearly, concisely and accurately as per company procedures.
- GS2.** to read, infer and interpret different types of engineering datasheets.
- GS3.** read and understand organizational health and safety instructions
- GS4.** ability to communicate, manages, direct & supervise unskilled and semi-skilled work force for accomplishment of installation project work.
- GS5.** ability to resolve conflict.
- GS6.** ability to translate technical data to simple, layman friendly director.
- GS7.** clearly communicate relevant information to supervisor
- GS8.** make decisions pertaining to the concerned area of work
- GS9.** plan and organize service feedback files/documents
- GS10.** manage relationships with customers who may be stressed, frustrated, confused, or angry
- GS11.** build customer relationships and use customer centric approach
- GS12.** think through the problem, evaluate the possible solution(s) and suggest an optimum /best possible solution(s)
- GS13.** deal with clients lacking the technical background to solve the problem on their own
- GS14.** identify immediate or temporary solutions to resolve delays
- GS15.** use the existing data to arrive at specific data points
- GS16.** use the existing data points for improving the call resolution time
- GS17.** use the existing data points to generate required reports for business
- GS18.** apply, analyze, and evaluate the information gathered from observation, experience, reasoning, or communication, as a guide to thought and action

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Reading of engineering drawings</i>	28	30	-	-
PC1. Read design layout of telecom structures for cable fabrication	4	6	-	-
PC2. Read electrical drawings of complex mechanical structures using manual and software driven methods	6	4	-	-
PC3. Working knowledge of conventionally deployed cable assembly	4	4	-	-
PC4. Understanding graphic symbols used on drawing sheet.	3	7	-	-
PC5. Basic knowledge of fibre-optic cable	5	5	-	-
PC6. Ability to understand diverse electrical diagrams	6	4	-	-
<i>Assembly and installation</i>	10	14	-	-
PC7. Arrange the required hardware tools like combination plier, wire cutter, wire stripper, nose pliers etc. for cable assembly	3	5	-	-
PC8. Ensure that tools, equipment's and other devices are in proper working condition and calibrated	3	2	-	-
PC9. Determine components required based on fault installation line.	3	3	-	-
PC10. Supervise cable assembly and wiring harnesses	1	4	-	-
<i>Report & Record</i>	8	10	-	-
PC11. Ensure record sheets are completed accurately, as per company guidelines	2	2	-	-
PC12. Retain documents for specific period of time, as per company procedure	2	4	-	-
PC13. Develop the report of assembly work for future inspection	4	4	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
NOS Total	46	54	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N4119
NOS Name	Tower/Bay installation Electrical
Sector	Telecom
Sub-Sector	Passive Infrastructure
Occupation	Operation & Maintenance
NSQF Level	4
Credits	1
Version	2.0
Last Reviewed Date	NA
Next Review Date	26/05/2025
NSQC Clearance Date	26/05/2022

Qualification Pack

TEL/N6313: Carry out the testing and troubleshooting of iATP sub-systems

Description

This OS unit is about testing various sub-systems of the indigenous Automatic Train Protection System (iATP - Kavach) such as the trackside equipment and on-board equipment.

Scope

The scope covers the following :

- Carry out the testing of trackside sub-systems
- Carry out the testing of on-board sub-systems

Elements and Performance Criteria

Carry out the testing of trackside sub-systems

To be competent, the user/individual on the job must be able to:

- PC1.** examine the stationary iATP unit is installed appropriately as per the specifications given by the manufacturer
- PC2.** check that the stationary iATP unit is able to connect to the Network Management System (NMS) without any issues
- PC3.** test the stationary iATP control unit to ensure it is able to maintain the recommended distance between trains
- PC4.** identify faults with different modules of the stationary iATP unit, such as vital computer card, communication interface card, event logger card
- PC5.** check for correct interfacing of vital inputs, Global Positioning System (GPS)/Global Navigation Satellite System (GNSS) to stationary iATP
- PC6.** carry out the relevant tests on RFID tags to ensure the RFID tag data is correct and RFID tags are programmed correctly
- PC7.** check the frequency of operation of RFID tags to ensure it is as per the requirement
- PC8.** check the readability of the data generated by RFID tags using a compatible RFID reader
- PC9.** inspect the stationary iATP for correct Panel Interlocking and Electronic/Solid State Interlocking
- PC10.** check the interlocking equipment has the correct database of static signalling related information, such as the location, RFID tags details and speed restrictions
- PC11.** test the stationary iATP has unobstructed Ultra High Frequency (UHF) radio communication to receive real-time information regarding location, speed and other parameters of trains within its jurisdiction
- PC12.** perform the appropriate tests using a simulator to ensure stationary iATP is able to detect relevant emergencies and send prompt commands to locomotives to stop
- PC13.** inspect the correct functioning of stationary iATP components, i.e. Station/LC/IB iATP Vital Computer, Stationary iATP Radio Unit, Remote Interface Unit, and Station Master Operation cum Indication Panel (SMOCIP)

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- PC14.** check the antenna for stationary communication system at station/IBS/midsection interlocked gate unit are functioning correctly and able to provide the recommended range of communication

Carry out the testing of on-board sub-systems

To be competent, the user/individual on the job must be able to:

- PC15.** check the connectivity and communication of on-board Loco iATP vital computer with stationary iATP units and other Loco iATP units
- PC16.** test the functioning of Loco iATP vital computer using a simulator to ensure it is able to supervise the movement of trains based on the information exchanged with stationary iATP units and other Loco iATP units
- PC17.** check the interfacing of Loco iATP vital computer with the train interface unit and brake interface unit
- PC18.** examine the two direction sensing speed sensor interface in Loco iATP vital computer to ensure it is able to measure distance and speed correctly
- PC19.** check for Loco iATP vital computer's correct interfacing with Balise Transmission Module (BTM) reader to read Balise fitted on the tracks in Train Protection and Warning System (TPWS) sections
- PC20.** check the GSM interface for uninterrupted connectivity with the centralized Network Monitoring System (NMS) and Key Management System (KMS)
- PC21.** test the USB interface to ensure error-free downloading of logs and other appropriate data for diagnostic purposes
- PC22.** check for the correct functioning of the Loco iATP radio unit's duplex radio modems to ensure smooth communication with the stationary iATP unit
- PC23.** test the Loco iATP unit's RFID readers to ensure they are able to read the RFID tags installed on the trackside and obtain the relevant information
- PC24.** check for the correct display/operation of various buttons/switches in Loco Pilot's Operation-cum-Indication Panel (LP-OCIP) in Driver Machine Interface (DMI), such as signal aspect display, train length display, current/ over/ permitted/ target speed, Movement Authority (MA), SOS operation, etc.
- PC25.** test the Brake Interface Unit (BIU) to ensure it is able to apply normal/ service and emergency of locomotives based on the type of brake command received from the Loco iATP unit

Carry out troubleshooting of iATP sub-systems

To be competent, the user/individual on the job must be able to:

- PC26.** carry out troubleshooting for any issues identified during testing, following the manufacturers' instructions
- PC27.** ensure any defective hardware is replaced with new and compatible hardware
- PC28.** co-ordinate with the manufacturer regarding any complex issues or manufacturing faults

Maintain records and resolve identified issues

To be competent, the user/individual on the job must be able to:

- PC29.** maintain detailed records concerning the testing activities and relevant troubleshooting carried out
- PC30.** co-ordinate with the stakeholders to identify and resolve any safety and recurring issues promptly and permanently

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Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the importance and functioning of trackside sub-systems of iATP, i.e. RFID tags, towers and antennas
- KU2.** the importance and functioning of on-board sub-systems of iATP, i.e. RFID reader, Loco iATP Vital Computer, Loco iATP Radio Unit, Driver Machine Interface (DMI) Brake Interface Unit (BIU)
- KU3.** the use of stationary iATP for various types of signaling including colour light signaling
- KU4.** the benefit of using stationary iATP at Intermediate Block Locations (IBS) and midsection interlocked Level Crossing Gates to overcome the problem of inadequate radio signal coverage of station iATP tower
- KU5.** the functions of the components of stationary iATP, i.e. Station/LC/IB iATP Vital Computer, Stationary iATP Radio Unit, Remote Interface Unit, and Station Master Operation cum Indication Panel (SMOCIP)
- KU6.** the architecture of Loco iATP vital computer with Real-Time Clock synchronization facility with Global Navigation Satellite System (GNSS) clock that helps in synchronizing with other iATP systems in hot standby manner
- KU7.** effectiveness of iATP in preventing Signal Passing at Danger (SPAD) cases, and unsafe situations arising due to over speeding of trains and train collisions
- KU8.** the importance of ensuring high speed and low-latency communication between trains and protection systems for real-time tracking and management of trains
- KU9.** the functions of key system components of iATP, i.e. Loco iATP, Loco Pilot - OCIP, Brake Interface Unit, RFID Reader, Station iATP, Radio Tower, Station Master - OCIP
- KU10.** the functioning of relevant signalling and telecommunications equipment used by railways
- KU11.** the communication process between Stationary iATP and Loco iATP
- KU12.** the process through which Loco iATP units installed in the locomotive determine the location of trains by reading pre-programmed RFID Tag data using the RFID reader
- KU13.** the importance of ensuring the RFID fixing arrangement is strong enough to withstand impact during normal ballast unloading
- KU14.** the process of testing the iATP trackside sub-systems
- KU15.** the process of testing the iATP on-board sub-systems
- KU16.** the troubleshooting to be carried out for common issues experienced with iATP trackside and on-board sub-systems
- KU17.** the importance of maintaining detailed records regarding the testing and troubleshooting activities
- KU18.** the importance of identifying and resolving the safety and recurring issues to ensure maximum safety and efficiency while using iATP

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** maintain work-related notes and records

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- GS2.** read the relevant literature to get the latest updates about the field of work
- GS3.** listen attentively to understand the information/ instructions being shared
- GS4.** communicate politely and professionally
- GS5.** plan and prioritise tasks to ensure timely completion
- GS6.** co-ordinate with the co-workers to achieve the work objectives
- GS7.** evaluate all possible solutions to a problem to select the best one
- GS8.** take quick decisions to deal with workplace emergencies/ accidents

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Carry out the testing of trackside sub-systems</i>	14	24	-	8
PC1. examine the stationary iATP unit is installed appropriately as per the specifications given by the manufacturer	1	1	-	1
PC2. check that the stationary iATP unit is able to connect to the Network Management System (NMS) without any issues	1	1	-	-
PC3. test the stationary iATP control unit to ensure it is able to maintain the recommended distance between trains	1	1	-	1
PC4. identify faults with different modules of the stationary iATP unit, such as vital computer card, communication interface card, event logger card	1	2	-	1
PC5. check for correct interfacing of vital inputs, Global Positioning System (GPS)/Global Navigation Satellite System (GNSS) to stationary iATP	1	2	-	1
PC6. carry out the relevant tests on RFID tags to ensure the RFID tag data is correct and RFID tags are programmed correctly	1	1	-	-
PC7. check the frequency of operation of RFID tags to ensure it is as per the requirement	1	2	-	-
PC8. check the readability of the data generated by RFID tags using a compatible RFID reader	1	2	-	1
PC9. inspect the stationary iATP for correct Panel Interlocking and Electronic/Solid State Interlocking	1	2	-	-
PC10. check the interlocking equipment has the correct database of static signalling related information, such as the location, RFID tags details and speed restrictions	1	2	-	-
PC11. test the stationary iATP has unobstructed Ultra High Frequency (UHF) radio communication to receive real-time information regarding location, speed and other parameters of trains within its jurisdiction	1	2	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. perform the appropriate tests using a simulator to ensure stationary iATP is able to detect relevant emergencies and send prompt commands to locomotives to stop	1	2	-	1
PC13. inspect the correct functioning of stationary iATP components, i.e. Station/LC/IB iATP Vital Computer, Stationary iATP Radio Unit, Remote Interface Unit, and Station Master Operation cum Indication Panel (SMOCIP)	1	2	-	1
PC14. check the antenna for stationary communication system at station/IBS/midsection interlocked gate unit are functioning correctly and able to provide the recommended range of communication	1	2	-	1
<i>Carry out the testing of on-board sub-systems</i>	11	25	-	5
PC15. check the connectivity and communication of on-board Loco iATP vital computer with stationary iATP units and other Loco iATP units	1	2	-	1
PC16. test the functioning of Loco iATP vital computer using a simulator to ensure it is able to supervise the movement of trains based on the information exchanged with stationary iATP units and other Loco iATP units	1	2	-	1
PC17. check the interfacing of Loco iATP vital computer with the train interface unit and brake interface unit	1	2	-	-
PC18. examine the two direction sensing speed sensor interface in Loco iATP vital computer to ensure it is able to measure distance and speed correctly	1	2	-	-
PC19. check for Loco iATP vital computer's correct interfacing with Balise Transmission Module (BTM) reader to read Balise fitted on the tracks in Train Protection and Warning System (TPWS) sections	1	2	-	-
PC20. check the GSM interface for uninterrupted connectivity with the centralized Network Monitoring System (NMS) and Key Management System (KMS)	1	2	-	1

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC21. test the USB interface to ensure error-free downloading of logs and other appropriate data for diagnostic purposes	1	2	-	-
PC22. check for the correct functioning of the Loco iATP radio unit's duplex radio modems to ensure smooth communication with the stationary iATP unit	1	2	-	-
PC23. test the Loco iATP unit's RFID readers to ensure they are able to read the RFID tags installed on the trackside and obtain the relevant information	1	2	-	-
PC24. check for the correct display/operation of various buttons/switches in Loco Pilot's Operation-cum-Indication Panel (LP-OCIP) in Driver Machine Interface (DMI), such as signal aspect display, train length display, current/ over/ permitted/ target speed, Movement Authority (MA), SOS operation, etc.	1	4	-	1
PC25. test the Brake Interface Unit (BIU) to ensure it is able to apply normal/ service and emergency of locomotives based on the type of brake command received from the Loco iATP unit	1	3	-	1
<i>Carry out troubleshooting of iATP sub-systems</i>	3	5	-	1
PC26. carry out troubleshooting for any issues identified during testing, following the manufacturers' instructions	1	2	-	-
PC27. ensure any defective hardware is replaced with new and compatible hardware	1	2	-	1
PC28. co-ordinate with the manufacturer regarding any complex issues or manufacturing faults	1	1	-	-
<i>Maintain records and resolve identified issues</i>	2	1	-	1
PC29. maintain detailed records concerning the testing activities and relevant troubleshooting carried out	1	1	-	-
PC30. co-ordinate with the stakeholders to identify and resolve any safety and recurring issues promptly and permanently	1	-	-	1
NOS Total	30	55	-	15

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National Occupational Standards (NOS) Parameters

NOS Code	TEL/N6313
NOS Name	Carry out the testing and troubleshooting of iATP sub-systems
Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Project Engineering
NSQF Level	5
Credits	2
Version	2.0
Last Reviewed Date	NA
Next Review Date	26/05/2025
NSQF Clearance Date	26/05/2022

Qualification Pack

TEL/N6314: Set up, simulate and test the Station and Loco Kavach

Description

This OS unit is about setting up the station and Loco Kavach, including performing the relevant simulations and tests.

Scope

The scope covers the following :

- Prepare the SIP/TOC and interface table
- Set up the Station and Loco Kavach
- Carry out Station and Loco Kavach simulations
- Carry out the relevant tests on Station and Loco Kavach

Elements and Performance Criteria

Prepare the SIP/TOC and interface table

To be competent, the user/individual on the job must be able to:

- PC1.** prepare the Signal Interlocking Plan (SIP)/Table of Control (TOC) for the station yard, based on the Engineering Scale Plan (ESP)
- PC2.** follow the relevant checklists to ensure correct information in the SIP and make appropriate corrections to remove any errors and inconsistencies
- PC3.** co-ordinate with the relevant personnel for the approval of SIP
- PC4.** prepare the interface table as per the railway's guidelines

Set up the Station and Loco Kavach

To be competent, the user/individual on the job must be able to:

- PC5.** prepare the relevant data using the SKAVACH data preparation tool
- PC6.** carry out appropriate configurations using the SKAVACH configuration tool
- PC7.** install the opto-electrical converter to convert optical signals into electrical signals
- PC8.** ensure the correct set up of Station and Loco Kavach as per the approved plan and the Original Equipment Manufacturer (OEM) instructions
- PC9.** ensure complete testing of the Station and Loco Kavach systems and sub-systems as per the approved checklists and OEM's instructions
- PC10.** carry out troubleshooting for any issues identified with the Station and Loco Kavach systems and sub-systems
- PC11.** co-ordinate with the OEM to resolve any firmware update and manufacturing defects
- PC12.** ensure appropriate documentation is carried out regarding the setup, testing and troubleshooting of the Station and Loco Kavach systems and sub-systems

Carry out Station and Loco Kavach simulations

To be competent, the user/individual on the job must be able to:

- PC13.** simulate loco inputs for Loco Kavach startup and Loco speed control using the Loco Kavach simulator

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PC14. simulate the station interlocking inputs using the Station Interlocking (IXL) Simulator

PC15. simulate the Loco movement using the RFID simulator

Carry out the relevant tests on Station and Loco Kavach

To be competent, the user/individual on the job must be able to:

PC16. prepare the setup for conducting the Factory Acceptance Test (FAT)

PC17. carry out the FAT for the stationary indigenous Automatic Train Protection System (iATP - Kavach) equipment

PC18. carry out Site Acceptance Test (SAT) as per the Research Designs and Standards Organisation (RDSO) specifications to check features, such as SPAD prevention, override, etc.

PC19. perform the integration tests and other tests as per the unit test cases

PC20. maintain the relevant documentation regarding the tests conducted

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the information to be recorded in a SIP, such as the type of Signalling & Interlocking arrangements, method of operation of points, signals, inter-signal distances, overlaps, line capacities, etc.
- KU2.** different types of block working and telecommunication facilities provided at a station signal
- KU3.** the importance of drawing SIP to scale in metric dimensions
- KU4.** the process of preparing the SIP/TOC for station yard
- KU5.** the importance of following the relevant checklists to ensure correct information in the SIP
- KU6.** the importance and process of getting the signaling plan approved by the Principal Chief Signal & Telecommunication Engineer (PCSTE)
- KU7.** the process of preparing the interface table as per the railway's guidelines
- KU8.** the process of preparing the relevant data using the SKAVACH data preparation tool
- KU9.** the process of using the SKAVACH configuration tool for carrying out appropriate configurations
- KU10.** the process of installing an opto-electrical converter and how it converts optical signals into electrical signals
- KU11.** the importance of ensuring the correct set up of Station and Loco Kavach as per the approved plan and the OEM's instructions
- KU12.** the process of testing the Station and Loco Kavach system and sub-systems as per the approved checklists and OEM's instructions
- KU13.** the process of troubleshooting the Station and Loco Kavach system and sub-systems
- KU14.** the relevant documentation to be carried out regarding the installation, testing and troubleshooting of the Station and Loco Kavach systems and sub-systems
- KU15.** the process of simulating loco inputs for Loco Kavach startup and Loco speed control using the Loco Kavach simulator
- KU16.** the process of simulating the station interlocking inputs using the Station Interlocking (IXL) Simulator
- KU17.** the process of simulating the Loco movement using the RFID simulator

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- KU18.** the process of simulating the train movement using RFID and Signal Passing At Danger (SPAD)
- KU19.** the process of carrying out FAT for the stationary iATP equipment
- KU20.** the process of carrying SAT as per the RDSO specifications to check the relevant features, such as SPAD prevention, override, etc.
- KU21.** the process of performing the integration tests and other tests as per the unit test cases
- KU22.** the relevant documentation to be maintained regarding the tests conducted
- KU23.** the RS-232 communications interface for connecting modems
- KU24.** the process of connecting RS-232 to a computer and using for bi-directional point to point link
- KU25.** the use of RS-485 EIA standard interface for data acquisition through the balanced transmission line
- KU26.** the benefit of using RS-485 in high data rates communications over long distances
- KU27.** the process of using RS-485 in multi-drop mode
- KU28.** different inputs of a Loco Kavach simulator, such as CAB1/CAB2 selection, forward/reverse direction, Loco speed control, etc.

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** maintain work-related notes and records
- GS2.** read the relevant literature to get the latest updates about the field of work
- GS3.** listen attentively to understand the information/ instructions being shared
- GS4.** communicate politely and professionally
- GS5.** plan and prioritise tasks to ensure timely completion
- GS6.** coordinate with the co-workers to achieve the work objectives
- GS7.** evaluate all possible solutions to a problem to select the best one
- GS8.** take quick decisions to deal with workplace emergencies/accidents

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Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare the SIP/TOC and interface table</i>	6	12	-	4
PC1. prepare the Signal Interlocking Plan (SIP)/Table of Control (TOC) for the station yard, based on the Engineering Scale Plan (ESP)	2	4	-	1
PC2. follow the relevant checklists to ensure correct information in the SIP and make appropriate corrections to remove any errors and inconsistencies	2	4	-	1
PC3. co-ordinate with the relevant personnel for the approval of SIP	1	2	-	1
PC4. prepare the interface table as per the railway's guidelines	1	2	-	1
<i>Set up the Station and Loco Kavach</i>	10	21	-	8
PC5. prepare the relevant data using the SKAVACH data preparation tool	1	2	-	1
PC6. carry out appropriate configurations using the SKAVACH configuration tool	1	2	-	1
PC7. install the opto-electrical converter to convert optical signals into electrical signals	1	2	-	1
PC8. ensure the correct set up of Station and Loco Kavach as per the approved plan and the Original Equipment Manufacturer (OEM) instructions	2	4	-	1
PC9. ensure complete testing of the Station and Loco Kavach systems and sub-systems as per the approved checklists and OEM's instructions	1	2	-	1
PC10. carry out troubleshooting for any issues identified with the Station and Loco Kavach systems and sub-systems	1	4	-	1
PC11. co-ordinate with the OEM to resolve any firmware update and manufacturing defects	1	2	-	1

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. ensure appropriate documentation is carried out regarding the setup, testing and troubleshooting of the Station and Loco Kavach systems and sub-systems	2	3	-	1
<i>Carry out Station and Loco Kavach simulations</i>	4	10	-	3
PC13. simulate loco inputs for Loco Kavach startup and Loco speed control using the Loco Kavach simulator	2	4	-	1
PC14. simulate the station interlocking inputs using the Station Interlocking (IXL) Simulator	1	4	-	1
PC15. simulate the Loco movement using the RFID simulator	1	2	-	1
<i>Carry out the relevant tests on Station and Loco Kavach</i>	5	12	-	5
PC16. prepare the setup for conducting the Factory Acceptance Test (FAT)	1	2	-	1
PC17. carry out the FAT for the stationary indigenous Automatic Train Protection System (iATP - Kavach) equipment	-	2	-	1
PC18. carry out Site Acceptance Test (SAT) as per the Research Designs and Standards Organisation (RDSO) specifications to check features, such as SPAD prevention, override, etc.	2	4	-	1
PC19. perform the integration tests and other tests as per the unit test cases	1	2	-	1
PC20. maintain the relevant documentation regarding the tests conducted	1	2	-	1
NOS Total	25	55	-	20

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National Occupational Standards (NOS) Parameters

NOS Code	TEL/N6314
NOS Name	Set up, simulate and test the Station and Loco Kavach
Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Project Engineering
NSQF Level	5
Credits	2
Version	2.0
Last Reviewed Date	NA
Next Review Date	26/05/2025
NSQF Clearance Date	26/05/2022

Qualification Pack

TEL/N6307: Provisioning of Active Network Equipment

Description

This OS unit provides standard guidelines for provisioning of SDH, DWDM equipment and ethernet services for Layer 2 devices using a Network Management System (NMS) installed in the Centralized Network Operation Centre (NOC).

Scope

The scope covers the following :

- Analyse the pre-requisites for provisioning
- Perform provisioning using the NMS
- Provision Dense Wavelength Division Multiplexing (DWDM), Amplifiers, Multi-Dwelling Unit (MDU) and Reconfigurable Optical Add/Drop Multiplexer (ROADM)
- Provision and activate end-to-end unprotected and protected circuits
- Provision ethernet services
- Deactivate and delete circuits
- Report and record provisioning

Elements and Performance Criteria

Analyse the pre-requisites for provisioning

To be competent, the user/individual on the job must be able to:

- PC1.** identify networking and system requirements
- PC2.** identify all equipment, services and other network elements that need to be provisioned and configured

Perform provisioning using NMS

To be competent, the user/individual on the job must be able to:

- PC3.** identify the required hardware and software to launch NMS
- PC4.** apply the credentials provided by supervisors for NMS Graphical User Interface (GUI)
- PC5.** perform provisioning and system support using node view
- PC6.** identify all network elements (nodes) in the Element Management System (EMS) depending on the equipment to provision - Software-Defined Networking (SDN) or DWDM
- PC7.** design the network hierarchy mapping it to the network view of NMS and EMS
- PC8.** perform installation, configuration and connectivity of NMS server and client software/switch
- PC9.** configure NMS to reflect the nodes

Provision DWDM Amplifiers, MDU units and ROADM

To be competent, the user/individual on the job must be able to:

- PC10.** provision the amplifier modules and Erbium-Doped Fiber Amplifier (EDFA)
- PC11.** select the amplifier gain (based on flat gain or customer gain) and the amplifier type (pre-amplifier or post-amplifier) for the DWDM networks
- PC12.** check for the gain using spectrometer as per requirements

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- PC13.** check optical supervisory channel for Dynamic Circuit Network (DCN) management amplification as per specifications
- PC14.** select transmission cards based on even or odd channel multiplexing and channel spacing
- PC15.** provision the correct DWDM SFPs in the MDU cards to ensure performance of multiplexing
- PC16.** provision the express channels in transmission cards to allow proper pass-through of other channels
- PC17.** ensure that client side SFPs are correctly provisioned as per requirements
- PC18.** provision ROADM based on the application

Provision and activate end-to-end unprotected and protected circuits

To be competent, the user/individual on the job must be able to:

- PC19.** ensure channels are configured (added and dropped) and provisioned correctly on the ROADM
- PC20.** configure NMS GUI to check its connectivity and layout using the topology view
- PC21.** configure circuits with correct parameters and label the nodes appropriately
- PC22.** verify creation of configured nodes and unprotected circuits in normal view of the GUI
- PC23.** analyse requirement of Plesiochronous Digital Hierarchy (PDH), Synchronous Digital Hierarchy (SDH), Virtual Concatenation Group (VCG) circuit types
- PC24.** analyse test results to localize faults and advise resolution of provisioning error(s)
- PC25.** identify the basic requirements for the protected circuit such as protected class of service menu, dual mode of protection in NMS, Wait-To-Restore (WTR) option, appropriate path, protection mechanism to be employed etc.
- PC26.** verify the protected circuit and filter the created circuit as specified in the guidelines

Provision ethernet services

To be competent, the user/individual on the job must be able to:

- PC27.** analyse the status of the circuit and activate the circuit, in case of pending status, as per instructions specified in the reference guide
- PC28.** ensure NMS is configured as per instructions specified in the reference guide
- PC29.** identify the connecting links between the ethernet devices and Layer 2 (L2) devices
- PC30.** interpret ethernet traffic flow between two device (one-to-one, one-to-many, or many-to-many) connections
- PC31.** analyse the different services such as point-to-point service (Tunnel and ELINE service), point-to-multipoint service (bridging and ELAN service)
- PC32.** provision point-to-point service in a point-to-multipoint environment and the capacity distribution profile
- PC33.** implement ethernet service from NMS GUI
- PC34.** measure Quality-of-Service (QoS) parameters for service and Operations, Administration and Maintenance (OAM) parameters

Deactivate and delete circuits

To be competent, the user/individual on the job must be able to:

- PC35.** configure per hop behaviour and traffic conditioning profiles
- PC36.** identify the circuit which requires deactivation or deletion
- PC37.** perform deactivation or deletion of the circuit from NMS

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PC38. verify status of the deleted circuit from the circuit list

Report and record provisioning

To be competent, the user/individual on the job must be able to:

PC39. verify all nodes to check for circuit deletion and record information of deleted circuits

PC40. notify all relevant parties (O&M, NOC team and supervisors) about the circuit provisioning, activation, deactivation or any other task related to the circuits

PC41. record all newly created circuits with relevant parameters in the provisioning report format

PC42. update all relevant circuit and NMS records and ensure these are available to all appropriate authorities for inspection

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. risks and impact of not following defined procedures/work instructions

KU2. escalation matrix for reporting identified incidents, troubles and/or emergencies e.g. system failures, fire and power failures

KU3. working of DWDM technology, its applications, key components, network architecture and key considerations related to the deployment of DWDM

KU4. basic network management concepts and elements such as OSI architecture, LAN-MAN-WAN-VLAN concept and its architecture

KU5. application of NMS and configuration of server and client

KU6. PDH, SDH technology, mapping and multiplexing technology of SDH, ROADM and cross-connects

KU7. TCI/IP, IP addressing, subnetting, IP Routing protocols, i.e. RIP, OSPF, IGRP, VCG etc.

KU8. basic equipment design and application of network systems and optical fiber transmission

KU9. basics of LINUX, MySQL and simple Java commands

KU10. TMF814 Multi-Technology Network Management (MTNM) Solution Set standards

KU11. functions of attenuators, test equipment, line tester, Ethernet tester, VSWR meter, RF power meter, Optical meter etc.

KU12. mapping and multiplexing technology of DWDM

KU13. ethernet networking i.e. half duplex, full duplex, physical and data link layer ethernet

KU14. core, distribution and access layer architecture

KU15. ethernet media and connector requirement

KU16. basics of L2 switching technologies

KU17. different WAN protocols

KU18. Ethernet-over-SDH (EoS) technology and implementation

KU19. login cables (RJ45, RS232 and Hi Speed USB) for different site equipment

KU20. common security aspects such as access control, authentication, nonrepudiation, data confidentiality, etc

KU21. lowest security levels of the components of network

KU22. configuration of switches inside a network element

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KU23. working of the different management frameworks in the NOC

KU24. provisioning reports to identify the preventive actions to eliminate error in provisioning

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read standards documents such as provisioning guides, reports, SOPs, user manuals

GS2. communicate with external stakeholders in their preferred language (English, Hindi or regional)

GS3. provide advice and guidance to peers and juniors

GS4. seek experts help timely, if needed at any stage

GS5. prioritise tasks in high-pressure environment

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Analyse the pre-requisites for provisioning</i>	1	4	-	1
PC1. identify networking and system requirements	-	2	-	-
PC2. identify all equipment, services and other network elements that need to be provisioned and configured	1	2	-	1
<i>Perform provisioning using NMS</i>	6	11	-	3
PC3. identify the required hardware and software to launch NMS	1	1	-	-
PC4. apply the credentials provided by supervisors for NMS Graphical User Interface (GUI)	-	1	-	1
PC5. perform provisioning and system support using node view	1	1	-	-
PC6. identify all network elements (nodes) in the Element Management System (EMS) depending on the equipment to provision - Software-Defined Networking (SDN) or DWDM	1	3	-	1
PC7. design the network hierarchy mapping it to the network view of NMS and EMS	1	1	-	1
PC8. perform installation, configuration and connectivity of NMS server and client software/switch	1	1	-	-
PC9. configure NMS to reflect the nodes	1	3	-	-
<i>Provision DWDM Amplifiers, MDU units and ROADM</i>	7	9	-	3
PC10. provision the amplifier modules and Erbium-Doped Fiber Amplifier (EDFA)	1	1	-	1
PC11. select the amplifier gain (based on flat gain or customer gain) and the amplifier type (pre-amplifier or post-amplifier) for the DWDM networks	-	1	-	1
PC12. check for the gain using spectrometer as per requirements	1	1	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. check optical supervisory channel for Dynamic Circuit Network (DCN) management amplification as per specifications	1	1	-	-
PC14. select transmission cards based on even or odd channel multiplexing and channel spacing	1	1	-	-
PC15. provision the correct DWDM SFPs in the MDU cards to ensure performance of multiplexing	1	1	-	1
PC16. provision the express channels in transmission cards to allow proper pass-through of other channels	-	1	-	-
PC17. ensure that client side SFPs are correctly provisioned as per requirements	1	1	-	-
PC18. provision ROADM based on the application	1	1	-	-
<i>Provision and activate end-to-end unprotected and protected circuits</i>	9	8	-	3
PC19. ensure channels are configured (added and dropped) and provisioned correctly on the ROADM	1	1	-	1
PC20. configure NMS GUI to check its connectivity and layout using the topology view	1	1	-	-
PC21. configure circuits with correct parameters and label the nodes appropriately	1	1	-	-
PC22. verify creation of configured nodes and unprotected circuits in normal view of the GUI	1	1	-	-
PC23. analyse requirement of Plesiochronous Digital Hierarchy (PDH), Synchronous Digital Hierarchy (SDH), Virtual Concatenation Group (VCG) circuit types	1	1	-	1
PC24. analyse test results to localize faults and advise resolution of provisioning error(s)	1	1	-	-
PC25. identify the basic requirements for the protected circuit such as protected class of service menu, dual mode of protection in NMS, Wait-To-Restore (WTR) option, appropriate path, protection mechanism to be employed etc.	2	1	-	1

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC26. verify the protected circuit and filter the created circuit as specified in the guidelines	1	1	-	-
<i>Provision ethernet services</i>	7	10	-	3
PC27. analyse the status of the circuit and activate the circuit, in case of pending status, as per instructions specified in the reference guide	1	1	-	-
PC28. ensure NMS is configured as per instructions specified in the reference guide	1	1	-	-
PC29. identify the connecting links between the ethernet devices and Layer 2 (L2) devices	1	1	-	-
PC30. interpret ethernet traffic flow between two device (one-to-one, one-to-many, or many-to-many) connections	-	1	-	-
PC31. analyse the different services such as point-to-point service (Tunnel and ELINE service), point-to-multipoint service (bridging and ELAN service)	1	1	-	1
PC32. provision point-to-point service in a point-to-multipoint environment and the capacity distribution profile	1	1	-	1
PC33. implement ethernet service from NMS GUI	1	1	-	-
PC34. measure Quality-of-Service (QoS) parameters for service and Operations, Administration and Maintenance (OAM) parameters	1	3	-	1
<i>Deactivate and delete circuits</i>	2	4	-	1
PC35. configure per hop behaviour and traffic conditioning profiles	-	1	-	-
PC36. identify the circuit which requires deactivation or deletion	1	1	-	-
PC37. perform deactivation or deletion of the circuit from NMS	-	1	-	1
PC38. verify status of the deleted circuit from the circuit list	1	1	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Report and record provisioning</i>	3	4	-	1
PC39. verify all nodes to check for circuit deletion and record information of deleted circuits	1	1	-	-
PC40. notify all relevant parties (O&M, NOC team and supervisors) about the circuit provisioning, activation, deactivation or any other task related to the circuits	1	1	-	-
PC41. record all newly created circuits with relevant parameters in the provisioning report format	-	1	-	1
PC42. update all relevant circuit and NMS records and ensure these are available to all appropriate authorities for inspection	1	1	-	-
NOS Total	35	50	-	15

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N6307
NOS Name	Provisioning of Active Network Equipment
Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Project Engineering
NSQF Level	4
Credits	2
Version	4.0
Last Reviewed Date	NA
Next Review Date	26/05/2025
NSQC Clearance Date	26/05/2022

Qualification Pack

DGT/VSQ/N0102: Employability Skills (60 Hours)

Description

This unit is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

Scope

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values - Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Career Development & Goal Setting
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

Elements and Performance Criteria

Introduction to Employability Skills

To be competent, the user/individual on the job must be able to:

- PC1.** identify employability skills required for jobs in various industries
- PC2.** identify and explore learning and employability portals

Constitutional values - Citizenship

To be competent, the user/individual on the job must be able to:

- PC3.** recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.
- PC4.** follow environmentally sustainable practices

Becoming a Professional in the 21st Century

To be competent, the user/individual on the job must be able to:

- PC5.** recognize the significance of 21st Century Skills for employment
- PC6.** practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life

Basic English Skills

To be competent, the user/individual on the job must be able to:

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- PC7.** use basic English for everyday conversation in different contexts, in person and over the telephone
- PC8.** read and understand routine information, notes, instructions, mails, letters etc. written in English
- PC9.** write short messages, notes, letters, e-mails etc. in English

Career Development & Goal Setting

To be competent, the user/individual on the job must be able to:

- PC10.** understand the difference between job and career
- PC11.** prepare a career development plan with short- and long-term goals, based on aptitude

Communication Skills

To be competent, the user/individual on the job must be able to:

- PC12.** follow verbal and non-verbal communication etiquette and active listening techniques in various settings
- PC13.** work collaboratively with others in a team

Diversity & Inclusion

To be competent, the user/individual on the job must be able to:

- PC14.** communicate and behave appropriately with all genders and PwD
- PC15.** escalate any issues related to sexual harassment at workplace according to POSH Act

Financial and Legal Literacy

To be competent, the user/individual on the job must be able to:

- PC16.** select financial institutions, products and services as per requirement
- PC17.** carry out offline and online financial transactions, safely and securely
- PC18.** identify common components of salary and compute income, expenses, taxes, investments etc
- PC19.** identify relevant rights and laws and use legal aids to fight against legal exploitation

Essential Digital Skills

To be competent, the user/individual on the job must be able to:

- PC20.** operate digital devices and carry out basic internet operations securely and safely
- PC21.** use e- mail and social media platforms and virtual collaboration tools to work effectively
- PC22.** use basic features of word processor, spreadsheets, and presentations

Entrepreneurship

To be competent, the user/individual on the job must be able to:

- PC23.** identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research
- PC24.** develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion
- PC25.** identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity

Customer Service

To be competent, the user/individual on the job must be able to:

- PC26.** identify different types of customers
- PC27.** identify and respond to customer requests and needs in a professional manner.

Qualification Pack

PC28. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

To be competent, the user/individual on the job must be able to:

PC29. create a professional Curriculum vitae (Résumé)

PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively

PC31. apply to identified job openings using offline /online methods as per requirement

PC32. answer questions politely, with clarity and confidence, during recruitment and selection

PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. need for employability skills and different learning and employability related portals

KU2. various constitutional and personal values

KU3. different environmentally sustainable practices and their importance

KU4. Twenty first (21st) century skills and their importance

KU5. how to use English language for effective verbal (face to face and telephonic) and written communication in formal and informal set up

KU6. importance of career development and setting long- and short-term goals

KU7. about effective communication

KU8. POSH Act

KU9. Gender sensitivity and inclusivity

KU10. different types of financial institutes, products, and services

KU11. how to compute income and expenditure

KU12. importance of maintaining safety and security in offline and online financial transactions

KU13. different legal rights and laws

KU14. different types of digital devices and the procedure to operate them safely and securely

KU15. how to create and operate an e- mail account and use applications such as word processors, spreadsheets etc.

KU16. how to identify business opportunities

KU17. types and needs of customers

KU18. how to apply for a job and prepare for an interview

KU19. apprenticeship scheme and the process of registering on apprenticeship portal

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read and write different types of documents/instructions/correspondence

GS2. communicate effectively using appropriate language in formal and informal settings

Qualification Pack

- GS3.** behave politely and appropriately with all
- GS4.** how to work in a virtual mode
- GS5.** perform calculations efficiently
- GS6.** solve problems effectively
- GS7.** pay attention to details
- GS8.** manage time efficiently
- GS9.** maintain hygiene and sanitization to avoid infection

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Introduction to Employability Skills</i>	1	1	-	-
PC1. identify employability skills required for jobs in various industries	-	-	-	-
PC2. identify and explore learning and employability portals	-	-	-	-
<i>Constitutional values - Citizenship</i>	1	1	-	-
PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.	-	-	-	-
PC4. follow environmentally sustainable practices	-	-	-	-
<i>Becoming a Professional in the 21st Century</i>	2	4	-	-
PC5. recognize the significance of 21st Century Skills for employment	-	-	-	-
PC6. practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-	-
<i>Basic English Skills</i>	2	3	-	-
PC7. use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-
PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
PC9. write short messages, notes, letters, e-mails etc. in English	-	-	-	-
<i>Career Development & Goal Setting</i>	1	2	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. understand the difference between job and career	-	-	-	-
PC11. prepare a career development plan with short- and long-term goals, based on aptitude	-	-	-	-
<i>Communication Skills</i>	2	2	-	-
PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings	-	-	-	-
PC13. work collaboratively with others in a team	-	-	-	-
<i>Diversity & Inclusion</i>	1	2	-	-
PC14. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC15. escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
<i>Financial and Legal Literacy</i>	2	3	-	-
PC16. select financial institutions, products and services as per requirement	-	-	-	-
PC17. carry out offline and online financial transactions, safely and securely	-	-	-	-
PC18. identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
<i>Essential Digital Skills</i>	3	4	-	-
PC20. operate digital devices and carry out basic internet operations securely and safely	-	-	-	-
PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively	-	-	-	-
PC22. use basic features of word processor, spreadsheets, and presentations	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Entrepreneurship</i>	2	3	-	-
PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
<i>Customer Service</i>	1	2	-	-
PC26. identify different types of customers	-	-	-	-
PC27. identify and respond to customer requests and needs in a professional manner.	-	-	-	-
PC28. follow appropriate hygiene and grooming standards	-	-	-	-
<i>Getting ready for apprenticeship & Jobs</i>	2	3	-	-
PC29. create a professional Curriculum vitae (Résumé)	-	-	-	-
PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
PC31. apply to identified job openings using offline /online methods as per requirement	-	-	-	-
PC32. answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-	-
NOS Total	20	30	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0102
NOS Name	Employability Skills (60 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	NA
Next Review Date	27/05/2024
NSQC Clearance Date	27/05/2021

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Element/ Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each Element/ PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training center based on these criteria.
6. To pass the Qualification Pack assessment, every trainee should score the Recommended Pass % aggregate for the QP.
7. In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack.

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Minimum Aggregate Passing % at QP Level : 70

(Please note: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
TEL/N2500.High density hand soldering of components on telecom boards	25	55	-	20	100	8
TEL/N4126.Handle fiber Constructs, Performance and Selection Criteria	30	50	-	20	100	8
TEL/N4200.Installation of passive FTTH/X components	35	55	-	10	100	8
TEL/N6238.Tower Site Performance Measurement and Parameter Recording	30	50	-	20	100	8
TEL/N6239.Tower Site Data Analysis and Reporting	30	50	-	20	100	8
TEL/N6240.Tower Site Optimization and Troubleshooting	30	60	-	10	100	8
TEL/N6315.Lay Wiring for Locomotives and Perform Testing	25	60	-	15	100	8
TEL/N6312.Plan and Supervise the Installation of RFID tags and Readers	30	50	-	20	100	8
TEL/N4118.Tower/Bay Installation Mechanical	46	54	-	-	100	6
TEL/N4119.Tower/Bay installation Electrical	46	54	-	-	100	6

Qualification Pack

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
TEL/N6313.Carry out the testing and troubleshooting of iATP sub-systems	30	55	-	15	100	6
TEL/N6314.Set up, simulate and test the Station and Loco Kavach	25	55	-	20	100	6
TEL/N6307.Provisioning of Active Network Equipment	35	50	-	15	100	6
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	-	-	50	6
Total	437	728	-	185	1350	100

Qualification Pack

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training

Qualification Pack

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.

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Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.