



Project Engineer - 5G Networks

QP Code: TEL/Q6306

Version: 1.0

NSQF Level: 5

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

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TEL/Q6306: Project Engineer - 5G Networks

Brief Job Description

The individual in this job is responsible for ensuring that the 5G site is active and running right after successful installation and commissioning of mobile site include 5G antenna, MIMO of Next Generation Nodes (gNodes). The individual should also possess knowledge of passive and active hardware equipment and the software at the time of installation. In addition, the individual is responsible in performing site acceptance test (include site audit, VSWR testing call testing and measuring physical positioning of antenna i.e., antenna tilt, azimuth, zenith angle, etc).

Personal Attributes

The individual needs to have the ability to upgrade skills with changing technologies, work in a team, take ownership of their work, multitask, and track multiple projects simultaneously with full dedication and willingness. The individual should possess the knowledge of passive and active hardware equipment and the software at the time of installation. The individual should have generic communication and leadership skills, attention to details, excellent problem-solving capabilities, strong quantitative abilities, and good interpersonal skills your innovation, customer focus, collaboration, value creation, and professionalism.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. [TEL/N6319: Check Availability of Hardware Equipment at the Site Location](#)
2. [TEL/N6320: Perform Installation and Commissioning of 5G Tower Site](#)
3. [TEL/N6321: Perform Compliance and Quality Checks](#)
4. [TEL/N6322: Carry out Acceptance Testing and Site Monitoring](#)
5. [TEL/N9103: Implement Effective Interaction at workplace](#)
6. [TEL/N9104: Manage Work, Resources and Safety at workplace](#)

Qualification Pack (QP) Parameters

Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Project Engineering
Country	India

NSQF Level	5
Aligned to NCO/ISCO/ISIC Code	NCO-2015/NIL
Minimum Educational Qualification & Experience	Post Graduate (in relevant field) OR B.E./B.Tech (Electronics/Telecom /IT and other relevant fields) OR Graduate (in relevant field) with 1 Year of experience in relevant field OR Diploma (after Class 12th of 3 years in Electronics/Telecom /IT and other relevant fields) with 1 Year of experience in relevant field OR Certificate-NSQF ((L4) Technician 5G - Active Network Installation) with 3 Years of experience in relevant field
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	NA
NSQC Approval Date	
Version	1.0

TEL/N6319: Check Availability of Hardware Equipment at the Site Location

Description

This OS unit is about various activities carried out before installation of 5G nodes at site.

Scope

The scope covers the following :

- Pre-requisites for 5G mobile/radio networking
- Carry out 5G NR site hardware/equipment installation
- Prepare site for 5G implementation

Elements and Performance Criteria

Pre-requisites for 5G mobile/radio networking

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

- PC1.** analyse 3GPP standards, budget, architectural and other design documents as per client specifications
- PC2.** collaborate with other departments and technical teams to transform top-level architectures and designs into deployment deliverables at site
- PC3.** identify the basic parameters of Multiple Input, Multiple Output (MIMO) antenna (diversity gain, MIMO capacity, etc.) for implementation of 5G antenna
- PC4.** analyse the radiation pattern of MIMO antenna along with network slicing or Network Function Virtualization (NFV)
- PC5.** ensure that the software test is planned with automated scripts for testing after installation and backhaul network is mapped with the upcoming 5G site programs for testing are working and bug-free for testing after installation

Carry out 5G NR site hardware/equipment installation

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

- PC6.** ensure that all passive equipment such as antenna (single, dual, triple band, MIMO), feeder and jumper cable and all the other necessary equipment are available at site
- PC7.** ensure that all active equipment such as gNode, microwave link device, etc. are available at site
- PC8.** ensure that different utilities, such as command centre, alarm manager, historical alarm report, PM reports, alarm correlation etc. are working and as per the required version
- PC9.** integrate orchestration among teams, Network Function Virtualization Infrastructure (NFVI), and virtualized/cloud native network functions to ensure smooth deployment at site
- PC10.** analyse solution life cycle management activities to successful deployment such as evaluation and impact assessment of solution and its components, and/or revisions, if required
- PC11.** implement Proof of Concepts (PoC) and demonstrate these to customers to assure them of the delivery as per requirements
- PC12.** perform installation and commissioning of the equipment at the defined location at site

Prepare site and customer for 5G implementation

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

- PC13.** check the signal strength through various antenna parameters to ensure that it maps to the specifications as per the customer requirements
- PC14.** ensure that various adjustments/tilts have been made to the antenna to ensure proper zenith and azimuth angle

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** radio access technology (4G/5G)
- KU2.** fifth-generation (5G) Access domain and 3GPP specs and standards across L1, L2 and L3
- KU3.** VoLTE, VoWiFi, Advanced Messaging (RCS), Multi-ID, vEPC, Virtualized RAN(vRAN), O-RAN, Management and orchestration (MANO), Virtualized Network Functions (VNF)
- KU4.** message flows and parameters used in the messages for 5G procedures
- KU5.** cloud technologies, Open Edge Server and xHaul deployments in a cloud environment
- KU6.** risks and impact of not following defined procedures/work instructions
- KU7.** escalation matrix for reporting identified incidents, troubles and/or emergencies e.g. system failures, fire and power failures

Generic Skills (GS)

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

- GS1.** communicate with team members accurately
- GS2.** analyse and interpret the messages and prompts timely and correctly
- GS3.** communicate with external stakeholders in their preferred language (English, Hindi or regional)
- GS4.** provide advice and guidance to peers and juniors
- GS5.** seek experts help timely, if needed at any stage
- GS6.** prioritize tasks in high-pressure environment
- GS7.** interpret reports and numerical data
- GS8.** perform multiple tasks/activities at the same time
- GS9.** read standards documents such as provisioning guide, reports, requirement guides, user manuals
- GS10.** adapt new technologies

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Pre-requisites for 5G mobile/radio networking</i>	11	19	-	5
PC1. analyse 3GPP standards, budget, architectural and other design documents as per client specifications	4	3	-	1
PC2. collaborate with other departments and technical teams to transform top-level architectures and designs into deployment deliverables at site	2	4	-	1
PC3. identify the basic parameters of Multiple Input, Multiple Output (MIMO) antenna (diversity gain, MIMO capacity, etc.) for implementation of 5G antenna	2	4	-	1
PC4. analyse the radiation pattern of MIMO antenna along with network slicing or Network Function Virtualization (NFV)	1	3	-	1
PC5. ensure that the software test is planned with automated scripts for testing after installation and backhaul network is mapped with the upcoming 5G site programs for testing are working and bug-free for testing after installation	2	5	-	1
<i>Carry out 5G NR site hardware/equipment installation</i>	15	31	-	4
PC6. ensure that all passive equipment such as antenna (single, dual, triple band, MIMO), feeder and jumper cable and all the other necessary equipment are available at site	2	6	-	1
PC7. ensure that all active equipment such as gNode, microwave link device, etc. are available at site	1	3	-	1
PC8. ensure that different utilities, such as command centre, alarm manager, historical alarm report, PM reports, alarm correlation etc. are working and as per the required version	2	4	-	-
PC9. integrate orchestration among teams, Network Function Virtualization Infrastructure (NFVI), and virtualized/cloud native network functions to ensure smooth deployment at site	3	6	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. analyse solution life cycle management activities to successful deployment such as evaluation and impact assessment of solution and its components, and/or revisions, if required	3	5	-	-
PC11. implement Proof of Concepts (PoC) and demonstrate these to customers to assure them of the delivery as per requirements	2	4	-	-
PC12. perform installation and commissioning of the equipment at the defined location at site	2	3	-	1
<i>Prepare site and customer for 5G implementation</i>	4	10	-	1
PC13. check the signal strength through various antenna parameters to ensure that it maps to the specifications as per the customer requirements	2	6	-	1
PC14. ensure that various adjustments/tilts have been made to the antenna to ensure proper zenith and azimuth angle	2	4	-	-
NOS Total	30	60	-	10

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N6319
NOS Name	Check Availability of Hardware Equipment at the Site Location
Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Project Engineering
NSQF Level	5
Credits	TBD
Version	1.0
Next Review Date	NA

TEL/N6320: Perform Installation and Commissioning of 5G Tower Site

Description

This OS unit is about installation and commissioning of 5G tower site.

Scope

The scope covers the following :

- Perform pre-installation activities and checks
- Inspect routing of power, IF and RF Cables
- Carry out installation and commissioning of the gNodeB

Elements and Performance Criteria

Perform pre-installation activities and checks

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

- PC1.** verify availability of all gNodeB and transmission units required for installation and match with Bill of Material (BoM)
- PC2.** check availability of transmission racks required for the installation
- PC3.** interpret installation plan as received from the planning team and recommend modifications in the plan, if required
- PC4.** determine if any additional equipment, accessories are needed for installation
- PC5.** measure the current capacity of cables and equipment using Ammeter for total load consumption
- PC6.** identify appropriate MCBs are used at the rack for the installation as per power consumption of the equipment
- PC7.** verify that the MCB has -48 V DC and ground connectivity with the equipment
- PC8.** perform the steps for mounting the antenna on the tower (GBT, RTT, pole mount, etc)

Inspect routing of power, IF and RF Cables

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

- PC9.** ensure proper order and sequence of equipment in the rack
- PC10.** mount the antenna on the tower (GBT, RTT, Pole mount, etc.)
- PC11.** connect various cables from antenna to the tower shelter via feeder cable and convert to jumper cable/fiber cable
- PC12.** check interconnection of jumper/CPRI cables/RF cables/other cables at the site and ensure it is working properly
- PC13.** perform routing of power cable and traffic cable as per architecture and design
- PC14.** ensure that all cables are properly labelled with appropriate printed stickers/markers
- PC15.** ensure that the feeder and jumper cable are supported by the earthing wire
- PC16.** confirm that all the electrical wiring are completed and closed properly
- PC17.** carry out work to avoid damage to cables and connectors during connection and disconnection

Carry out installation and commissioning of gNodeB

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

- PC18.** perform installation of gNode inside/outside of the tower as per the planning guidelines
- PC19.** install and interconnect g-Node and microwave equipment
- PC20.** ensure proper power connection
- PC21.** identify all equipment and other network elements that need to be provisioned and configured
- PC22.** install Non Stand Alone (NSA) mode of 5G equipment as per installation design
- PC23.** ensure network equipment is configured for the flow of traffic as per the specifications
- PC24.** measure Quality of Service (QoS) parameters for Operations, Administration and Maintenance (OAM) parameter
- PC25.** perform network rollout activities and software upgrades of network nodes after installation
- PC26.** perform onboarding and validation of enterprise Virtual Network Functions
- PC27.** integrate new rollout sites and expansion of existing sites to provide congestion free network
- PC28.** integrate scientific computation, data acquisition, and processing for successful site installation and commissioning as per the planning guidelines

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** radio Network Design, KPI analysis documents, Parameter Tuning, GPRS/EDGE Optimization, Radio network optimisation, OSS, RAN optimisation tools
- KU2.** application traffic generators like iPerf, IxLoad, etc
- KU3.** kubernetes/ Dockers, CI/CD (Ansible, Jenkins's pipeline)
- KU4.** Continuous integration (CI) and continuous delivery (CD)
- KU5.** Third Generation (3G) /LTE/ Fifth Generation (5G) -Layer 2 or Layer 3 Protocols RRC, RLC, PDCP
- KU6.** typical performance parameters to be monitored for day-to-day network operations to check installation and commissioning
- KU7.** records to be maintained for installation and commissioning, and implication of non-maintenance

Generic Skills (GS)

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

- GS1.** interpret notifications, alert and messages during installations
- GS2.** read and comprehend reports and instructions
- GS3.** analyse problems and suggest their suitable solutions
- GS4.** implement ways to timely take actions on issues
- GS5.** multitask activities in daily life at work

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Perform pre-installation activities and checks</i>	15	18	-	4
PC1. verify availability of all gNodeB and transmission units required for installation and match with Bill of Material (BoM)	2	2	-	1
PC2. check availability of transmission racks required for the installation	2	3	-	-
PC3. interpret installation plan as received from the planning team and recommend modifications in the plan, if required	2	2	-	1
PC4. determine if any additional equipment, accessories are needed for installation	2	3	-	-
PC5. measure the current capacity of cables and equipment using Ammeter for total load consumption	2	2	-	1
PC6. identify appropriate MCBs are used at the rack for the installation as per power consumption of the equipment	2	2	-	-
PC7. verify that the MCB has -48 V DC and ground connectivity with the equipment	1	2	-	1
PC8. perform the steps for mounting the antenna on the tower (GBT, RTT, pole mount, etc)	2	2	-	-
<i>Inspect routing of power, IF and RF Cables</i>	11	13	-	4
PC9. ensure proper order and sequence of equipment in the rack	1	1	-	1
PC10. mount the antenna on the tower (GBT, RTT, Pole mount, etc.)	1	1	-	-
PC11. connect various cables from antenna to the tower shelter via feeder cable and convert to jumper cable/fiber cable	1	1	-	-
PC12. check interconnection of jumper/CPRI cables/RF cables/other cables at the site and ensure it is working properly	2	1	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. perform routing of power cable and traffic cable as per architecture and design	1	2	-	1
PC14. ensure that all cables are properly labelled with appropriate printed stickers/markers	1	1	-	-
PC15. ensure that the feeder and jumper cable are supported by the earthing wire	1	2	-	1
PC16. confirm that all the electrical wiring are completed and closed properly	2	2	-	-
PC17. carry out work to avoid damage to cables and connectors during connection and disconnection	1	2	-	1
<i>Carry out installation and commissioning of gNodeB</i>	14	19	-	2
PC18. perform installation of gNode inside/outside of the tower as per the planning guidelines	1	1	-	1
PC19. install and interconnect g-Node and microwave equipment	2	2	-	-
PC20. ensure proper power connection	1	1	-	-
PC21. identify all equipment and other network elements that need to be provisioned and configured	1	1	-	-
PC22. install Non Stand Alone (NSA) mode of 5G equipment as per installation design	2	2	-	1
PC23. ensure network equipment is configured for the flow of traffic as per the specifications	1	2	-	-
PC24. measure Quality of Service (QoS) parameters for Operations, Administration and Maintenance (OAM) parameter	2	3	-	-
PC25. perform network rollout activities and software upgrades of network nodes after installation	1	2	-	-
PC26. perform onboarding and validation of enterprise Virtual Network Functions	1	2	-	-
PC27. integrate new rollout sites and expansion of existing sites to provide congestion free network	1	2	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC28. integrate scientific computation, data acquisition, and processing for successful site installation and commissioning as per the planning guidelines	1	1	-	-
NOS Total	40	50	-	10

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N6320
NOS Name	Perform Installation and Commissioning of 5G Tower Site
Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Project Engineering
NSQF Level	5
Credits	TBD
Version	1.0
Next Review Date	NA

TEL/N6321: Perform Compliance and Quality Checks

Description

This OS unit is about ensuring that ensuring all installations and commissioning of the equipment at site is in full compliance to the standards and guidelines of the service provider and as per site requirements.

Scope

The scope covers the following :

- Perform installation and commissioning checks
- Prepare compliance report

Elements and Performance Criteria

Perform installation and commissioning checks

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

- PC1.** Identify the commissioning requirements of the site as per network planning team of service provider
- PC2.** perform a test run of the gNodeB, microwave equipment, Non Stand Alone mode of 5G and all the software after upgrades as per the guidelines
- PC3.** record test results in pre-defined report formats
- PC4.** identify the issues/bugs found during the test run of the equipment and suggest appropriate solutions
- PC5.** coordinate with the team to resolve the issues and again run the equipment to verify the changes
- PC6.** ensure that all the processes are carried out properly and site is up and running
- PC7.** report closure of the tasks/activities along with status report of the nodes

Prepare Compliance Report

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

- PC8.** identify the documents/reports/logs that are required to be updated/maintained
- PC9.** prepare a compliance report of the installed and commissioned equipment
- PC10.** ensure that the documents/reports are readily available to the concerned authority for inspection
- PC11.** receive a sign-off from authorized personnel on all reports before marking site installation and compliance closed/achieved

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** types of documentation in organization and its importance
- KU2.** records to be maintained and implication of non-maintenance
- KU3.** testing of 5G gNodeB
- KU4.** test tools like IXIA, Spirent for traffic generation and monitoring at local level

- KU5.** User Equipment (UE) simulators like Aeroflex TM500 and Keysight
- KU6.** UE debuggers like QXDM, XCAL and TEMS
- KU7.** channel and network Emulators
- KU8.** various formats (PDF/XML/HTML/DOC) in which the report needs to be generated

Generic Skills (GS)

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

- GS1.** interpret notifications, alert and messages
- GS2.** read and comprehend generated report
- GS3.** analyse problems and implement suitable solutions

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Perform installation and commissioning checks</i>	20	34	-	6
PC1. Identify the commissioning requirements of the site as per network planning team of service provider	3	5	-	1
PC2. perform a test run of the gNodeB, microwave equipment, Non Stand Alone mode of 5G and all the software after upgrades as per the guidelines	4	5	-	1
PC3. record test results in pre-defined report formats	2	5	-	-
PC4. identify the issues/bugs found during the test run of the equipment and suggest appropriate solutions	2	4	-	1
PC5. coordinate with the team to resolve the issues and again run the equipment to verify the changes	2	4	-	1
PC6. ensure that all the processes are carried out properly and site is up and running	4	6	-	1
PC7. report closure of the tasks/activities along with status report of the nodes	3	5	-	1
<i>Prepare Compliance Report</i>	15	21	-	4
PC8. identify the documents/reports/logs that are required to be updated/maintained	4	5	-	1
PC9. prepare a compliance report of the installed and commissioned equipment	4	6	-	1
PC10. ensure that the documents/reports are readily available to the concerned authority for inspection	3	5	-	1
PC11. receive a sign-off from authorized personnel on all reports before marking site installation and compliance closed/achieved	4	5	-	1
NOS Total	35	55	-	10

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N6321
NOS Name	Perform Compliance and Quality Checks
Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Project Engineering
NSQF Level	5
Credits	TBD
Version	1.0
Next Review Date	NA

TEL/N6322: Carry out Acceptance Testing and Site Monitoring

Description

This OS unit is about carrying out acceptance test and site monitoring.

Scope

The scope covers the following :

- Prepare for Acceptance Testing (AT) and monitoring
- Perform acceptance test of new site
- Monitor site performance and traffic
- Communicate test results and record

Elements and Performance Criteria

Prepare for Acceptance Testing (AT) and monitoring

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

- PC1.** design a test strategy with provided resources and tools/simulators for site testing
- PC2.** develop thorough and in-depth test cases for 5G Standalone (SA) and Non-Standalone (NSA) features for testing 5G gNodeB functionalities based on 3GPP standards, architectural and other design documents from client
- PC3.** analyse procedures for testing and other teams to follow
- PC4.** analyse test scripts using available test tools, and devise innovative ways of re-creating practically possible scenarios
- PC5.** build test setups as per the approved/finalized test strategy
- PC6.** obtain checklists to perform site AT from the supervisor and other site documents and specifications from the projects team

Perform acceptance test of new site

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

- PC7.** execute test cases and validate the test status based on the expectations (typical expected results) for the test cases
- PC8.** check availability and functioning of test equipment required to perform AT
- PC9.** verify that correct software version of the equipment is installed in the system (laptop/desktop/tablet) and the software is ready to use
- PC10.** supervise completion of physical tests of the site as per the checklist such as physical upkeep, shelter status, weather proofing, equipment grouting, effective cabling, earthing and utilization of connectors
- PC11.** perform debugging of field data and identify potential problems and re-creating the same in the lab for future cases
- PC12.** ensure completion of logical tests (VSWR levels, alarm connectivity, equipment connectivity) as per the checklist
- PC13.** coordinate with the infrastructure engineer and the riggers to complete testing of passive infrastructure such as antenna tilt, diesel generator working, battery/SMPS condition
- PC14.** validate solution configurations and functionality

PC15. analyze test results to ensure existing functionality is optimum and recommend corrective action, in case of discrepancies

PC16. consult with development and infrastructure engineers in resolution of problems

Monitor site performance and traffic

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

PC17. carry out performance monitoring and analysis of mobile/radio network using authorized test instruments and equipment

PC18. perform network health checks such as Continuous CFCs monitoring, status of all Radio Nodes, functioning of each cards and applications, calls in each n every sector/carrier etc.

PC19. fix and resolve problems to stabilize and optimize customer networks, in case any discrepancies are observed

PC20. take backup prior to Operation and Maintenance Center (OMC) stop, start and shutdown, re-sync Operation and Maintenance Center - Radio (OMCR) databases

PC21. perform routine check-ups and backups of site as per specifications (Daily, Weekly, Monthly backups)

PC22. update and backup system logs, test tool logs for later use in debugging issues and identifying accurate root causes for the problems seen on the system under test or in the network

PC23. identify and regularize performance trends to keep a constant check on network performance and successful monitoring of site key statistics

PC24. ensure timely logical fault analysis and rectification

Communicate test results and record

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

PC25. inform all relevant stake holders (including NOC team, other supervisors and the projects) of the test results

PC26. communicate to the project team about the remaining punch points that need to be addressed before site handover

PC27. update all required documents as per organisational norms and formats

PC28. ensure updated documents are available to all appropriate authorities for further inspection

PC29. maintain documentation of test results to assist in debugging and modification of software for future

PC30. provide written and verbal feedback to other teams and supervisors/managers for technical appraisals of programming languages, systems, and computation software

PC31. analyze and find suitable solutions for issues reported by customers, through contact with them gather data and information about any specific problem that has been reported

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. types of documentation in organization and its importance

KU2. records to be maintained and implication of non-maintenance

KU3. testing of 5G gNodeBs

Generic Skills (GS)

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

- GS1.** interpret notifications, alert and messages
- GS2.** read and comprehend generated report
- GS3.** analyse problems and implement suitable solutions

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Prepare for Acceptance Testing (AT) and monitoring</i>	9	11	-	3
PC1. design a test strategy with provided resources and tools/simulators for site testing	1	1	-	-
PC2. develop thorough and in-depth test cases for 5G Standalone (SA) and Non-Standalone (NSA) features for testing 5G gNodeB functionalities based on 3GPP standards, architectural and other design documents from client	2	3	-	1
PC3. analyse procedures for testing and other teams to follow	1	1	-	-
PC4. analyse test scripts using available test tools, and devise innovative ways of re-creating practically possible scenarios	2	2	-	1
PC5. build test setups as per the approved/finalized test strategy	1	2	-	-
PC6. obtain checklists to perform site AT from the supervisor and other site documents and specifications from the projects team	2	2	-	1
<i>Perform acceptance test of new site</i>	14	15	-	2
PC7. execute test cases and validate the test status based on the expectations (typical expected results) for the test cases	1	2	-	-
PC8. check availability and functioning of test equipment required to perform AT	1	1	-	-
PC9. verify that correct software version of the equipment is installed in the system (laptop/desktop/tablet) and the software is ready to use	2	1	-	1
PC10. supervise completion of physical tests of the site as per the checklist such as physical upkeep, shelter status, weather proofing, equipment grouting, effective cabling, earthing and utilization of connectors	2	3	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. perform debugging of field data and identify potential problems and re-creating the same in the lab for future cases	1	2	-	-
PC12. ensure completion of logical tests (VSWR levels, alarm connectivity, equipment connectivity) as per the checklist	2	1	-	-
PC13. coordinate with the infrastructure engineer and the riggers to complete testing of passive infrastructure such as antenna tilt, diesel generator working, battery/SMPS condition	2	1	-	1
PC14. validate solution configurations and functionality	1	1	-	-
PC15. analyze test results to ensure existing functionality is optimum and recommend corrective action, in case of discrepancies	1	2	-	-
PC16. consult with development and infrastructure engineers in resolution of problems	1	1	-	-
<i>Monitor site performance and traffic</i>	10	12	-	3
PC17. carry out performance monitoring and analysis of mobile/radio network using authorized test instruments and equipment	1	2	-	1
PC18. perform network health checks such as Continuous CFCs monitoring, status of all Radio Nodes, functioning of each cards and applications, calls in each n every sector/carrier etc.	2	1	-	-
PC19. fix and resolve problems to stabilize and optimize customer networks, in case any discrepancies are observed	1	2	-	-
PC20. take backup prior to Operation and Maintenance Center (OMC) stop, start and shutdown, re-sync Operation and Maintenance Center - Radio (OMCR) databases	1	1	-	1
PC21. perform routine check-ups and backups of site as per specifications (Daily, Weekly, Monthly backups)	1	1	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC22. update and backup system logs, test tool logs for later use in debugging issues and identifying accurate root causes for the problems seen on the system under test or in the network	2	2	-	-
PC23. identify and regularize performance trends to keep a constant check on network performance and successful monitoring of site key statistics	1	2	-	1
PC24. ensure timely logical fault analysis and rectification	1	1	-	-
<i>Communicate test results and record</i>	7	12	-	2
PC25. inform all relevant stake holders (including NOC team, other supervisors and the projects) of the test results	1	2	-	-
PC26. communicate to the project team about the remaining punch points that need to be addressed before site handover	1	2	-	1
PC27. update all required documents as per organisational norms and formats	1	2	-	-
PC28. ensure updated documents are available to all appropriate authorities for further inspection	1	2	-	-
PC29. maintain documentation of test results to assist in debugging and modification of software for future	1	2	-	-
PC30. provide written and verbal feedback to other teams and supervisors/managers for technical appraisals of programming languages, systems, and computation software	1	1	-	1
PC31. analyze and find suitable solutions for issues reported by customers, through contact with them gather data and information about any specific problem that has been reported	1	1	-	-
NOS Total	40	50	-	10

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N6322
NOS Name	Carry out Acceptance Testing and Site Monitoring
Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Project Engineering
NSQF Level	5
Credits	TBD
Version	1.0
Next Review Date	NA

TEL/N9103: Implement Effective Interaction at workplace

Description

This OS unit is about communicating with superiors and colleagues as well as customers and other stakeholders in own or other work groups within as well as outside the organisation

Scope

The scope covers the following :

- Interact effectively with superiors
- Interact effectively with colleagues and customers
- Respect differences of gender and ability

Elements and Performance Criteria

Interact effectively with superiors

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

- PC1.** interpret work requirements from the superior and customers
- PC2.** report any unforeseen disruptions or delays to superiors and/or concerned person
- PC3.** achieve productivity and quality of work as per the company procedure

Interact effectively with colleagues and customers

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

- PC4.** explain the work requirements and the scope of work to the team
- PC5.** communicate information using different techniques such as face-to-face, telephonic and written means
- PC6.** co-ordinate with team to integrate work as per requirements
- PC7.** respect colleagues and customers and communicate taking care of their personal spaces
- PC8.** find solutions to work related difficulties with mutual agreement with colleagues and customers
- PC9.** resolve conflicts within the team at work to achieve smooth workflow
- PC10.** motivate team members to put organizational goals over individual goals
- PC11.** encourage the team to provide feedback on any issues facing them

Respect differences of gender and ability

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

- PC12.** ensure personal behaviour of self and team is conducted taking gender and disability of the person into consideration
- PC13.** demonstrate sensitivity towards gender and person with disability while communicating
- PC14.** list the different types of disabilities with their respective issues
- PC15.** provide help to PwD team members in overcoming any challenges faced in work
- PC16.** use inclusive language irrespective of the disability and the gender of the person
- PC17.** treat all colleagues and co-workers equally
- PC18.** respect personal space of colleagues and co-workers

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** importance of effective and different means of communication and establishing good working relationships with colleagues and superiors
- KU2.** importance of helping colleagues with problems, in order to meet quality and time standards as a team
- KU3.** different methods of communication
- KU4.** different types of information that colleagues might need and the importance of providing this information in an appropriate manner
- KU5.** helping colleagues with problems, in order to meet quality and time standards as a team
- KU6.** organisation's policies and procedures for working with colleagues and superior
- KU7.** implications of own work on the work and schedule of others
- KU8.** importance of understanding consequences of gender based behaviour
- KU9.** gender based concepts, issues and legislation
- KU10.** organisation standards and guidelines to be followed for PwD and knowledge about laws, acts and provisions defined for PwD by the statutory bodies and the right way to use them including various medical conditions associated with PwD
- KU11.** health and safety requirements at workplace for PwD
- KU12.** rights and duties at workplace with respect to PwD
- KU13.** process of recruiting people for a particular job profile w.r.t PwD and gender
- KU14.** various government / private schemes and benefits available for PwD and information about various institutes working for PwD to enable in providing livelihood opportunities for PwD

Generic Skills (GS)

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

- GS1.** complete written work with attention to detail and read instructions/guidelines/procedures
- GS2.** listen effectively and orally communicate information
- GS3.** ask for clarification and advice from the concerned person
- GS4.** deliver consistent and reliable service to customers
- GS5.** check that the work meets customer requirements
- GS6.** practice and acceptance of gender and its concepts
- GS7.** develop empathy across genders and towards PwD
- GS8.** reflect on own gender identity, gender roles and PwD issues
- GS9.** engage and participate in discussions to end gender and disability discrimination
- GS10.** improve and modify work practices
- GS11.** maintain positive and effective relationships with colleagues and customers
- GS12.** evaluate the possible solution(s) to the problem

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Interact effectively with superiors</i>	2	9	-	1
PC1. interpret work requirements from the superior and customers	1	2	-	-
PC2. report any unforeseen disruptions or delays to superiors and/or concerned person	1	2	-	1
PC3. achieve productivity and quality of work as per the company procedure	-	5	-	-
<i>Interact effectively with colleagues and customers</i>	13	27	-	5
PC4. explain the work requirements and the scope of work to the team	2	3	-	-
PC5. communicate information using different techniques such as face-to-face, telephonic and written means	2	4	-	1
PC6. co-ordinate with team to integrate work as per requirements	-	4	-	1
PC7. respect colleagues and customers and communicate taking care of their personal spaces	-	3	-	-
PC8. find solutions to work related difficulties with mutual agreement with colleagues and customers	3	3	-	-
PC9. resolve conflicts within the team at work to achieve smooth workflow	-	4	-	1
PC10. motivate team members to put organizational goals over individual goals	3	4	-	1
PC11. encourage the team to provide feedback on any issues facing them	3	2	-	1
<i>Respect differences of gender and ability</i>	15	24	-	4
PC12. ensure personal behaviour of self and team is conducted taking gender and disability of the person into consideration	2	4	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. demonstrate sensitivity towards gender and person with disability while communicating	2	3	-	1
PC14. list the different types of disabilities with their respective issues	2	3	-	1
PC15. provide help to PwD team members in overcoming any challenges faced in work	2	3	-	-
PC16. use inclusive language irrespective of the disability and the gender of the person	2	3	-	1
PC17. treat all colleagues and co-workers equally	2	3	-	-
PC18. respect personal space of colleagues and co-workers	3	5	-	1
NOS Total	30	60	-	10

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N9103
NOS Name	Implement Effective Interaction at workplace
Sector	Telecom
Sub-Sector	Generic
Occupation	Generic
NSQF Level	5
Credits	TBD
Version	1.0
Last Reviewed Date	24/02/2022
Next Review Date	24/02/2026
NSQC Clearance Date	24/02/2022

TEL/N9104: Manage Work, Resources and Safety at workplace

Description

This OS unit is about planning work and implementing sustainable as well as healthy practices for safety and optimal use of resources

Scope

The scope covers the following :

- Manage learning and self-direction
- Develop critical thinking and problem solving
- Perform work as per quality standards
- Maintain safe and secure working environment
- Comply with material / energy / electricity conservation practices

Elements and Performance Criteria

Manage learning and self-direction

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

- PC1.** develop technical and personal skills to be updated with new technologies prevalent in the industry
- PC2.** train the team such that they are able to adapt latest products/services in their working environment
- PC3.** identify opportunities for team building workshops and motivational trainings

Develop critical thinking and problem solving

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

- PC4.** guide the team to be accountable for timely completion of tasks
- PC5.** analyse problems accurately to be able to correctly suggest suitable solutions to the concerned persons
- PC6.** train the team to estimate the cause of the problem and validate

Perform work as per quality standards

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

- PC7.** implement ways to keep immediate as well as team's work area clean and tidy
- PC8.** maintain efficiency and productivity while performing role/responsibility
- PC9.** supervise the team to ensure that the work is done as per the assigned and agreed requirements
- PC10.** create schedules and rosters for the team to ensure they understand individual work requirements

Maintain safe and secure working environment

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

- PC11.** identify organisation's health, safety, security policies and procedures
- PC12.** instruct team to report any identified breaches in health, safety, and security policies and procedures to the designated person

PC13. manage hazards such as illness, accidents, fires or any other natural calamity safely, as per organisation's emergency procedures, within the limits of individual's authority

PC14. report any hazard outside the individual's authority to the relevant person in line with organisational procedures and warn others who may be affected

Material / energy / electricity conservation practices

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

PC15. implement ways to optimize usage of material including water in various tasks/activities/processes

PC16. supervise the team to ensure responsible use of resources

PC17. motivate the team to carry out routine cleaning of tools, machine and equipment

PC18. guide the team to optimize use of electricity/energy in various tasks/activities/processes

PC19. implement periodic checks of the functioning of the equipment/machine and rectify wherever required

PC20. guide the team to report malfunctioning and lapses in maintenance of equipment

PC21. implement ways to use electrical equipment and appliances properly

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. strategies pertinent to the field that can be used to pursue an advancement of skills

KU2. key performance indicators for the new tasks

KU3. feedback processes and formats

KU4. timelines and goals as well as their relevance to work allocated

KU5. importance of quality and timely delivery of the product/service

KU6. layout of the workstation and equipment used

KU7. escalation matrix and its importance, especially in case of emergencies

KU8. ways of time and cost management

KU9. rules/regulation for maintaining health and safety at workplace

KU10. meaning of hazard, different types of health and safety hazards found in the workplace, risks and threats based on the nature of work

KU11. procedures to report breaches in health, safety and security

KU12. ways of managing resources and material efficiently

KU13. ways to recognize common electrical problems and common practices of conserving electricity

Generic Skills (GS)

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

GS1. explore various pathways to expand one's own learning skills and abilities

GS2. analyse feedback for improving one's way of working

GS3. interpret feedback from superiors in a constructive way

GS4. identify the root cause of problems

- GS5.** understand the problem by asking significant questions to clarify the various points of view on the problem
- GS6.** seek clarifications from superior about the job requirement
- GS7.** work in a team with full coordination of team members
- GS8.** read instructions/guidelines and Standard Operating Practices (SOP) documents
- GS9.** complete tasks efficiently and accurately within stipulated time
- GS10.** record data in statutory documents relevant to safety and hygiene
- GS11.** escalate/refer all anomalies to the concerned persons
- GS12.** identify the most suitable course of action for completing the task using provided resources

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Manage learning and self-direction</i>	4	5	-	-
PC1. develop technical and personal skills to be updated with new technologies prevalent in the industry	2	1	-	-
PC2. train the team such that they are able to adapt latest products/services in their working environment	1	2	-	-
PC3. identify opportunities for team building workshops and motivational trainings	1	2	-	-
<i>Develop critical thinking and problem solving</i>	4	7	-	-
PC4. guide the team to be accountable for timely completion of tasks	2	3	-	-
PC5. analyse problems accurately to be able to correctly suggest suitable solutions to the concerned persons	1	2	-	-
PC6. train the team to estimate the cause of the problem and validate	1	2	-	-
<i>Perform work as per quality standards</i>	5	9	-	4
PC7. implement ways to keep immediate as well as team's work area clean and tidy	1	2	-	-
PC8. maintain efficiency and productivity while performing role/responsibility	1	2	-	2
PC9. supervise the team to ensure that the work is done as per the assigned and agreed requirements	1	2	-	1
PC10. create schedules and rosters for the team to ensure they understand individual work requirements	2	3	-	1
<i>Maintain safe and secure working environment</i>	12	13	-	2
PC11. identify organisation's health, safety, security policies and procedures	3	3	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC12. instruct team to report any identified breaches in health, safety, and security policies and procedures to the designated person	3	3	-	-
PC13. manage hazards such as illness, accidents, fires or any other natural calamity safely, as per organisation's emergency procedures, within the limits of individual's authority	3	4	-	1
PC14. report any hazard outside the individual's authority to the relevant person in line with organisational procedures and warn others who may be affected	3	3	-	1
<i>Material / energy / electricity conservation practices</i>	15	16	-	4
PC15. implement ways to optimize usage of material including water in various tasks/activities/processes	1	2	-	1
PC16. supervise the team to ensure responsible use of resources	2	2	-	1
PC17. motivate the team to carry out routine cleaning of tools, machine and equipment	2	2	-	1
PC18. guide the team to optimize use of electricity/energy in various tasks/activities/processes	3	4	-	-
PC19. implement periodic checks of the functioning of the equipment/machine and rectify wherever required	2	2	-	1
PC20. guide the team to report malfunctioning and lapses in maintenance of equipment	3	2	-	-
PC21. implement ways to use electrical equipment and appliances properly	2	2	-	-
NOS Total	40	50	-	10

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N9104
NOS Name	Manage Work, Resources and Safety at workplace
Sector	Telecom
Sub-Sector	Generic
Occupation	Generic
NSQF Level	5
Credits	TBD
Version	1.0
Last Reviewed Date	24/02/2022
Next Review Date	24/02/2026
NSQC Clearance Date	24/02/2022

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.

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/N6319.Check Availability of Hardware Equipment at the Site Location	30	60	-	10	100	17
TEL/N6320.Perform Installation and Commissioning of 5G Tower Site	40	50	-	10	100	17
TEL/N6321.Perform Compliance and Quality Checks	35	55	-	10	100	17
TEL/N6322.Carry out Acceptance Testing and Site Monitoring	40	50	-	10	100	17
TEL/N9103.Implement Effective Interaction at workplace	30	60	-	10	100	16
TEL/N9104.Manage Work, Resources and Safety at workplace	40	50	-	10	100	16
Total	215	325	-	60	600	100

Acronyms

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

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.
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.