Machine Learning (ML) Telecom Architect

QP Code: TEL/Q6603

Version: 3.0

NSQF Level: 5

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Contents

TEL/Q6603: Machine Learning (ML) Telecom Architect

Brief Job Description

The ML Telecom Architect is responsible for designing and deploying machine learning models tailored to telecom use cases. The role focuses on developing intelligent systems for detecting fraudulent calls, analyzing suspicious links, and enhancing network security through predictive analytics. A solid understanding of telecom protocols and data flows is essential to identify anomalies and improve system reliability. In addition to fraud detection, the architect will collaborate with network and data science teams to integrate ML solutions into telecom platforms, optimizing real-time decision-making. The candidate should be proficient in supervised and unsupervised learning techniques, with experience in handling large-scale telecom datasets to extract actionable insights.

Personal Attributes

The individual in this role should possess strong analytical and coordination skills, with a foundational understanding of telecom technologies and drone systems. The individual should be detail-oriented, proactive in problem-solving, and capable of managing complex operations involving real-time communication. The individual should also exhibit effective communication, decision-making, and stakeholder management abilities.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. TEL/N6610: Prepare for Development of ML-Based Telecom Network Intelligence Systems
2. TEL/N6611: Develop and Support Implementation of ML Solutions in Telecom Operations
3. TEL/N9103: Implement Effective Interaction at workplace
4. TEL/N9104: Manage Work, Resources and Safety at workplace
5. DGT/VSQ/N0102: Employability Skills (60 Hours)

Qualification Pack (QP) Parameters

Sector	Telecom
Sub-Sector	Network Managed Services
Occupation	Data Handling – Network Managed Services
Country	India

NSQF Level	5
Credits	18
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7422.6603
Minimum Educational Qualification & Experience	Completed 2nd year of UG (UG Diploma) (of 3-year/ 4-years UG) OR Completed 2nd year diploma after 12th OR Previous relevant Qualification of NSQF Level (4.5) with 1.5 years of experience relevant experience OR Previous relevant Qualification of NSQF Level (4) with 3 Years of experience relevant experience
Minimum Level of Education for Training in School	12th Class
Pre-Requisite License or Training	Basic knowledge of Python and Data Structures
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	NA
NSQC Approval Date	
Version	3.0

TEL/N6610: Prepare for Development of ML-Based Telecom Network Intelligence Systems

Description

This OS covers the skills and knowledge required to design, build, train, and validate machine learning models for telecom applications using appropriate tools, techniques, and datasets.

Scope

The scope covers the following :

- Analyse and handle telecom data for ML
- Plan and map ML solutions to telecom problems
- Plan ML system architecture and pipeline

Elements and Performance Criteria

Analyse and handle telecom data for ML

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

PC1. identify various sources of telecom data, including OSS/BSS, sensors, and usage logs.

PC2. extract and interpret telecom data in common formats such as CSV, JSON, and Parquet.

PC3. evaluate datasets for completeness, accuracy, and relevance to the ML problem.

PC4. conduct exploratory data analysis (EDA) to identify patterns, trends, and outliers.

PC5. detect issues in data distribution, imbalance, or missing values affecting model accuracy.

PC6. apply data validation techniques to ensure consistency and integrity in telecom datasets.

PC7. pre-process data by handling missing values, outliers, and encoding categorical features.

PC8. analyse feature correlations and remove multicollinearity using the variance inflation factor or domain knowledge.

PC9. address class imbalance through data augmentation techniques like SMOTE or GANs.

PC10. create synthetic datasets using augmentation to simulate rare or imbalanced telecom events.

Plan and map ML solutions to telecom problems

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

PC11. assess the business and technical feasibility of telecom problems for ML implementation.

PC12. identify and align telecom use cases (e.g., churn prediction, fraud detection) with suitable ML problem types (e.g., classification, regression).

PC13. map problems to appropriate ML techniques or algorithms based on data characteristics and objectives.

PC14. evaluate existing ML systems or solutions for performance, drift, and limitations.

PC15. select appropriate metrics and benchmarks to evaluate model effectiveness in telecom.

PC16. use dimensionality reduction techniques such as PCA or autoencoders for feature selection.

PC17. apply advanced feature engineering techniques based on domain knowledge and data types.

PC18. design success criteria and outcome indicators for telecom ML applications.

Plan ML system architecture and pipeline

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

PC19. define the lifecycle of an ML system in a telecom environment.

PC20. design a modular and scalable pipeline that includes data pre-processing, modelling, and evaluation.

PC21. select appropriate industry-standard ML tools and libraries suited for telecom use cases.

PC22. use version control (e.g., Git, DVC) to manage datasets and experiment iterations.

PC23. implement experiment tracking using tools like MLflow or TensorBoard.

PC24. consider data privacy and telecom regulatory compliance while designing ML workflows.

PC25. estimate timelines, resource requirements, and risks for implementing telecom ML solutions.

PC26. define monitoring strategies for post-deployment model performance in telecom networks.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. types, formats, and sources of telecom data used for ML applications.

KU2. types, sources, and structure of telecom data, including CDRs, signal strength logs, and network KPIs.

KU3. criteria for selecting and evaluating datasets in ML projects.

KU4. role and steps of Exploratory Data Analysis (EDA) in understanding telecom datasets.

KU5. common issues in telecom datasets and how they impact ML outcomes.

KU6. key differences between traditional software engineering and ML-based systems.

KU7. structure and phases of a typical ML project lifecycle.

KU8. how to assess business and technical feasibility for ML deployment in telecom.

KU9. telecom-specific use cases suited for machine learning and AI.

KU10. techniques for data validation and ensuring data quality.

KU11. data pre-processing methods and their impact on model performance.

KU12. feature selection and dimensionality reduction techniques.

KU13. data augmentation approaches and their relevance in telecom.

KU14. telecom model evaluation metrics like precision, recall, F1-score, and ROC-AUC.

KU15. factors affecting model drift and performance degradation.

KU16. tools and frameworks commonly used in ML pipelines (e.g., Scikit-learn, TensorFlow, PyTorch).

KU17. methods for ensuring reproducibility, modularity, and scalability in ML pipelines.

Generic Skills (GS)

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

GS1. communicate effectively with team members and stakeholders regarding data and ML requirements.

GS2. apply logical reasoning to evaluate data quality and identify issues.

GS3. demonstrate time management while planning and preparing ML systems.
GS4. work collaboratively with cross-functional telecom and data science teams.
GS5. practice self-learning to stay updated with evolving ML tools and telecom use cases.
GS6. maintain attention to detail in data pre-processing and pipeline planning.
GS7. follow structured problem-solving approaches to design ML solutions.
GS8. prioritise tasks based on business impact and feasibility assessments.
GS9. ensure ethical decision-making when handling sensitive telecom datasets.

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Analyse and handle telecom data for ML	**10**	**22**	**-**	**4**
PC1. identify various sources of telecom data, including OSS/BSS, sensors, and usage logs.	1	2	-	1
PC2. extract and interpret telecom data in common formats such as CSV, JSON, and Parquet.	1	1	-	-
PC3. evaluate datasets for completeness, accuracy, and relevance to the ML problem.	1	2	-	1
PC4. conduct exploratory data analysis (EDA) to identify patterns, trends, and outliers.	1	3	-	-
PC5. detect issues in data distribution, imbalance, or missing values affecting model accuracy.	1	3	-	-
PC6. apply data validation techniques to ensure consistency and integrity in telecom datasets.	1	2	-	1
PC7. pre-process data by handling missing values, outliers, and encoding categorical features.	1	2	-	-
PC8. analyse feature correlations and remove multicollinearity using the variance inflation factor or domain knowledge.	1	2	-	-
PC9. address class imbalance through data augmentation techniques like SMOTE or GANs.	1	2	-	1
PC10. create synthetic datasets using augmentation to simulate rare or imbalanced telecom events.	1	3	-	-
Plan and map ML solutions to telecom problems	**10**	**20**	**-**	**3**
PC11. assess the business and technical feasibility of telecom problems for ML implementation.	1	2	-	-
PC12. identify and align telecom use cases (e.g., churn prediction, fraud detection) with suitable ML problem types (e.g., classification, regression).	1	2	-	1
PC13. map problems to appropriate ML techniques or algorithms based on data characteristics and objectives.	2	2	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC14. evaluate existing ML systems or solutions for performance, drift, and limitations.	1	3	-	-
PC15. select appropriate metrics and benchmarks to evaluate model effectiveness in telecom.	1	2	-	1
PC16. use dimensionality reduction techniques such as PCA or autoencoders for feature selection.	1	3	-	1
PC17. apply advanced feature engineering techniques based on domain knowledge and data types.	1	3	-	-
PC18. design success criteria and outcome indicators for telecom ML applications.	2	3	-	-
Plan ML system architecture and pipeline	**10**	**18**	**-**	**3**
PC19. define the lifecycle of an ML system in a telecom environment.	2	2	-	1
PC20. design a modular and scalable pipeline that includes data pre-processing, modelling, and evaluation.	1	3	-	-
PC21. select appropriate industry-standard ML tools and libraries suited for telecom use cases.	1	2	-	-
PC22. use version control (e.g., Git, DVC) to manage datasets and experiment iterations.	1	3	-	-
PC23. implement experiment tracking using tools like MLflow or TensorBoard.	1	2	-	1
PC24. consider data privacy and telecom regulatory compliance while designing ML workflows.	1	2	-	1
PC25. estimate timelines, resource requirements, and risks for implementing telecom ML solutions.	1	2	-	-
PC26. define monitoring strategies for post-deployment model performance in telecom networks.	2	2	-	-
NOS Total	**30**	**60**	**-**	**10**

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N6610
NOS Name	Prepare for Development of ML-Based Telecom Network Intelligence Systems
Sector	Telecom
Sub-Sector	
Occupation	Data Handling – Network Managed Services
NSQF Level	5
Credits	7
Version	1.0
Next Review Date	NA

TEL/N6611: Develop and Support Implementation of ML Solutions in Telecom Operations

Description

This OS covers the competencies to support the deployment, integration, and performance monitoring of ML systems in telecom environments, including model serving, automation, and feedback incorporation.

Scope

The scope covers the following :

- Develop and fine-tune ML models for telecom applications
- Deploy ML models using industry-standard frameworks
- Integrate and monitor deployed ML systems in telecom environment
- Support lifecycle management and continuous improvement of ML systems

Elements and Performance Criteria

Develop and fine-tune ML models for telecom applications

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

PC1. identify and analyze telecom fraud patterns such as SIM box usage, call spoofing, phishing links, and SMS fraud from historical data logs and call detail records (CDRs).

PC2. train and optimise ML models using hyperparameter tuning (GridSearchCV, Optuna).

PC3. evaluate model performance using precision, recall, false positive rates, and update detection rules based on emerging fraud trends and feedback from fraud investigation teams.

PC4. implement time series forecasting for telecom traffic load using Prophet or LSTM models.

PC5. develop and train machine learning models (e.g., anomaly detection, classification) to flag suspicious call behavior and link-based fraud in real time or batch mode.

PC6. perform model compression or pruning to optimise inference latency for edge devices.

Deploy ML models using industry-standard frameworks

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

PC7. integrate fraud detection algorithms with telecom monitoring systems (e.g., OSS/BSS platforms) to enable automated alerts, call blocking, or traffic throttling.

PC8. containerise ML models using Docker and test deployment readiness for cloud (AWS, GCP, Azure) or edge environments.

PC9. build CI/CD pipelines using Jenkins, GitHub Actions, or GitLab CI for automated deployment and rollback.

Integrate and monitor deployed ML systems in telecom environment

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

PC10. implement model versioning and metadata tracking using MLflow or DVC.

PC11. create and configure monitoring dashboards (e.g., Grafana, Prometheus) for model performance metrics.

PC12. automate ML workflows (e.g., training, retraining, deployment) using Apache Airflow or Kubeflow.

PC13. simulate retraining workflows based on model drift or significant data shifts.

PC14. track latency, throughput, memory usage, and system bottlenecks in production environments.

Support lifecycle management and continuous improvement of ML systems

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

PC15. collaborate with data scientists, telecom engineers, and business analysts to translate model output into business actions.

PC16. document system architecture, deployment steps, SOPs, and model governance protocols.

PC17. interpret ML model output and visualise insights using dashboards (e.g., Tableau, Power BI).

PC18. evaluate cost-performance trade-offs of deployed models and recommend optimisation strategies.

PC19. support post-deployment lifecycle, including bug tracking, incident response, and customer feedback integration.

PC20. ensure models comply with telecom regulatory standards (e.g., TRAI, DoT).

PC21. report any unforeseen disruptions or delays to superiors and/or the concerned person.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. algorithmic techniques suited for telecom challenges: classification, regression, clustering, time-series forecasting.

KU2. evaluation metrics applicable to telecom (e.g., precision-recall tradeoffs in fraud detection).

KU3. telecom infrastructure constraints (e.g., low-latency, edge deployment, bandwidth optimisation).

KU4. frameworks and libraries for ML development (e.g., scikit-learn, TensorFlow, PyTorch, LightGBM).

KU5. rest API development principles and common libraries (Flask, FastAPI).

KU6. benefits of containerisation and orchestration using Docker and Kubernetes.

KU7. CI/CD principles and tools applicable to ML lifecycle management.

KU8. strategies for model retraining, drift detection, and feedback loop automation.

KU9. tools for model versioning, experiment tracking, and auditability (e.g., DVC, MLflow).

KU10. visualisation tools and methods for reporting ML performance to non-technical stakeholders.

KU11. business impact mapping of ML systems in telecom: cost savings, customer experience, and retention.

KU12. ethical ML practices, data privacy, and telecom regulatory compliance (e.g., GDPR, NDCP).

KU13. cost-performance balancing in large-scale ML model deployments.

KU14. importance of project documentation, SOPs, and cross-functional collaboration in telecom.

KU15. automation tools for orchestrating ML pipelines (e.g., Kubeflow, Airflow).

Generic Skills (GS)

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

GS1. communicate technical findings effectively with both technical and non-technical stakeholders.
GS2. collaborate with interdisciplinary teams for ML system development and deployment.
GS3. plan and manage time to meet development milestones and deployment schedules.
GS4. adapt to changing telecom data trends, tools, and regulatory requirements.
GS5. think critically to troubleshoot ML system performance issues.
GS6. apply numeracy skills for interpreting model metrics and optimisation trade-offs.
GS7. prioritise tasks under constraints of time, data, or resource availability.
GS8. interpret business needs and translate them into actionable ML features or metrics.
GS9. document procedures clearly for reproducibility and audit trails.
GS10. maintain a customer-centric mindset while implementing predictive solutions.

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Develop and fine-tune ML models for telecom applications	**7**	**18**	**-**	**3**
PC1. identify and analyze telecom fraud patterns such as SIM box usage, call spoofing, phishing links, and SMS fraud from historical data logs and call detail records (CDRs).	2	2	-	1
PC2. train and optimise ML models using hyperparameter tuning (GridSearchCV, Optuna).	1	5	-	-
PC3. evaluate model performance using precision, recall, false positive rates, and update detection rules based on emerging fraud trends and feedback from fraud investigation teams.	2	3	-	1
PC4. implement time series forecasting for telecom traffic load using Prophet or LSTM models.	1	3	-	-
PC5. develop and train machine learning models (e.g., anomaly detection, classification) to flag suspicious call behavior and link-based fraud in real time or batch mode.	1	3	-	-
PC6. perform model compression or pruning to optimise inference latency for edge devices.	-	2	-	1
Deploy ML models using industry-standard frameworks	**2**	**15**	**-**	**1**
PC7. integrate fraud detection algorithms with telecom monitoring systems (e.g., OSS/BSS platforms) to enable automated alerts, call blocking, or traffic throttling.	1	5	-	-
PC8. containerise ML models using Docker and test deployment readiness for cloud (AWS, GCP, Azure) or edge environments.	1	5	-	1
PC9. build CI/CD pipelines using Jenkins, GitHub Actions, or GitLab CI for automated deployment and rollback.	-	5	-	-
Integrate and monitor deployed ML systems in telecom environment	**8**	**15**	**-**	**2**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. implement model versioning and metadata tracking using MLflow or DVC.	2	3	-	1
PC11. create and configure monitoring dashboards (e.g., Grafana, Prometheus) for model performance metrics.	1	3	-	-
PC12. automate ML workflows (e.g., training, retraining, deployment) using Apache Airflow or Kubeflow.	2	4	-	-
PC13. simulate retraining workflows based on model drift or significant data shifts.	2	2	-	-
PC14. track latency, throughput, memory usage, and system bottlenecks in production environments.	1	3	-	1
Support lifecycle management and continuous improvement of ML systems	**13**	**12**	**-**	**4**
PC15. collaborate with data scientists, telecom engineers, and business analysts to translate model output into business actions.	2	1	-	1
PC16. document system architecture, deployment steps, SOPs, and model governance protocols.	2	2	-	-
PC17. interpret ML model output and visualise insights using dashboards (e.g., Tableau, Power BI).	1	2	-	1
PC18. evaluate cost-performance trade-offs of deployed models and recommend optimisation strategies.	2	2	-	-
PC19. support post-deployment lifecycle, including bug tracking, incident response, and customer feedback integration.	2	3	-	1
PC20. ensure models comply with telecom regulatory standards (e.g., TRAI, DoT).	2	1	-	-
PC21. report any unforeseen disruptions or delays to superiors and/or the concerned person.	2	1	-	1
NOS Total	**30**	**60**	**-**	**10**

National Occupational Standards (NOS) Parameters

NOS Code	TEL/N6611
NOS Name	Develop and Support Implementation of ML Solutions in Telecom Operations
Sector	Telecom
Sub-Sector	
Occupation	Data Handling – Network Managed Services
NSQF Level	5
Credits	7
Version	1.0
Next Review Date	NA

TEL/N9103: Implement Effective Interaction at workplace

Description

This OS unit is about communicating with superiors, colleagues, customers, and other stakeholders in a respectful, inclusive, and productive manner.

Scope

The scope covers the following :

- Interact effectively with supervisors and stakeholders
- Collaborate efficiently with colleagues and customers
- Practice inclusive communication at workplace

Elements and Performance Criteria

Interact effectively with supervisors and stakeholders

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

PC1. interpret and clarify work requirements and expectations from supervisors or stakeholders

PC2. report any delays, risks, or unforeseen disruptions to the appropriate authority promptly

PC3. deliver work outputs as per quality, productivity, and timeline standards defined by the organisation.

Collaborate efficiently with colleagues and customers

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

PC4. share work requirements and expectations clearly with team members

PC5. communicate using appropriate channels (e.g., face-to-face, phone, e-mail, video conferencing, chat) based on context

PC6. coordinate effectively with others to integrate efforts and achieve collective goals

PC7. respect colleagues' and customers' personal and professional boundaries

PC8. collaboratively solve work-related issues or bottlenecks with mutual consent

PC9. resolve interpersonal or operational conflicts within the team professionally and constructively

PC10. motivate team members to align with organisational objectives over individual interests

PC11. encourage two-way feedback and constructive dialogue within the team.

Practice inclusive communication at workplace

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

PC12. ensure own and team's conduct reflects respect for gender, disability, and diversity in all interactions

PC13. communicate with sensitivity toward the needs of persons with disabilities (PwD) and across gender identities

PC14. demonstrate awareness of different types of disabilities and their implications in workplace communication

PC15. assist team members with disabilities in overcoming barriers to work

PC16. use inclusive and respectful language in all verbal and written communication

PC17. treat all individuals with dignity and fairness, avoiding bias or discrimination
PC18. respect others' personal space, cultural preferences, and accessibility needs.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. importance of effective communication and team collaboration in achieving workplace goals
KU2. modes and tools of communication for various scenarios (in-person, virtual, asynchronous)
KU3. organisational processes for task assignment, reporting, and escalation
KU4. impact of one's work on the team's workflow and deliverables
KU5. strategies to handle team dynamics and conflict resolution
KU6. principles of inclusive behaviour and workplace diversity
KU7. basic concepts of gender sensitivity, unconscious bias, and respectful workplace behaviour
KU8. categories of disabilities and associated workplace considerations
KU9. rights, entitlements, and accommodations applicable to PwDs under national and organisational policies
KU10. health, safety, and digital accessibility requirements for inclusive workplaces
KU11. government and private schemes supporting employment and inclusion of PwDs
KU12. practices to encourage inclusive recruitment and professional growth

Generic Skills (GS)

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

GS1. communicate clearly and respectfully using verbal, non-verbal, and written modes.
GS2. maintain professionalism in customer and colleague interactions
GS3. identify, address, or escalate interpersonal challenges constructively
GS4. impact of reflect on one's biases, assumptions, and inclusive practices
GS5. empathise with and advocate for individuals from underrepresented groups
GS6. promote collaboration and resolve conflicts through dialogue and consensus
GS7. engage in continuous improvement of interpersonal and team dynamics
GS8. use digital communication tools responsibly and inclusively in a hybrid work setting.

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Interact effectively with supervisors and stakeholders	**5**	**10**	**-**	**1**
PC1. interpret and clarify work requirements and expectations from supervisors or stakeholders	2	3	-	-
PC2. report any delays, risks, or unforeseen disruptions to the appropriate authority promptly	2	4	-	1
PC3. deliver work outputs as per quality, productivity, and timeline standards defined by the organisation.	1	3	-	-
Collaborate efficiently with colleagues and customers	**14**	**26**	**-**	**6**
PC4. share work requirements and expectations clearly with team members	2	3	-	1
PC5. communicate using appropriate channels (e.g., face-to-face, phone, e-mail, video conferencing, chat) based on context	2	4	-	1
PC6. coordinate effectively with others to integrate efforts and achieve collective goals	2	3	-	-
PC7. respect colleagues' and customers' personal and professional boundaries	2	3	-	1
PC8. collaboratively solve work-related issues or bottlenecks with mutual consent	2	3	-	1
PC9. resolve interpersonal or operational conflicts within the team professionally and constructively	1	3	-	1
PC10. motivate team members to align with organisational objectives over individual interests	2	4	-	-
PC11. encourage two-way feedback and constructive dialogue within the team.	1	3	-	1
Practice inclusive communication at workplace	**11**	**24**	**-**	**3**
PC12. ensure own and team's conduct reflects respect for gender, disability, and diversity in all interactions	2	3	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. communicate with sensitivity toward the needs of persons with disabilities (PwD) and across gender identities	2	4	-	1
PC14. demonstrate awareness of different types of disabilities and their implications in workplace communication	1	4	-	-
PC15. assist team members with disabilities in overcoming barriers to work	1	4	-	-
PC16. use inclusive and respectful language in all verbal and written communication	2	3	-	-
PC17. treat all individuals with dignity and fairness, avoiding bias or discrimination	1	3	-	1
PC18. respect others' personal space, cultural preferences, and accessibility needs.	2	3	-	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	1
Version	3.0
Last Reviewed Date	19/08/2025
Next Review Date	30/06/2028
NSQC Clearance Date	19/08/2025

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

Description

This OS unit is about applying sustainable practices, maintaining workplace safety, and ensuring optimal utilisation of resources to meet quality standards and deadlines in a dynamic work environment.

Scope

The scope covers the following :

- Manage learning and self-direction
- Foster critical thinking and problem-solving
- Perform work as per quality and performance standards
- Maintain a safe, secure, and healthy workplace
- Implement sustainable and efficient resource usage practices

Elements and Performance Criteria

Manage learning and self-direction

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

PC1. identify individual and team training needs relevant to current and emerging job roles

PC2. participate in learning activities and skill development programs

PC3. encourage team participation in professional development, cross-functional knowledge sharing, and upskilling initiatives.

Foster critical thinking and problem-solving

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

PC4. guide team members to analyse problems logically and identify root causes

PC5. suggest appropriate and timely solutions to operational challenges

PC6. enable the team to evaluate outcomes of decisions and refine processes accordingly.

Perform work as per quality and performance standards

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

PC7. organise individual and team work based on task priorities and deadlines

PC8. monitor performance to ensure quality, accuracy, and timely completion of tasks

PC9. allocate responsibilities and establish work schedules to optimise team productivity

PC10. implement systems to track adherence to standard operating procedures (SOPs)

Maintain a safe, secure, and healthy workplace

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

PC11. communicate safety policies and procedures clearly to all team members

PC12. address risks such as accidents, electrical hazards, cyber risks, or health incidents as per emergency protocols

PC13. report hazards, breaches, or incidents promptly to the designated authority

PC14. promote practices that support mental well-being and respectful workplace behaviour.

Implement sustainable and efficient resource usage practices

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

PC15. implement ways to optimise the usage of material, energy and water, in various tasks/activities/processes
PC16. encourage regular upkeep of tools, machinery, and digital assets to extend usability
PC17. ensure team compliance with environmentally responsible work practices
PC18. promote the use of energy-efficient systems and paperless documentation where feasible.
PC19. report and resolve malfunctions or wastage through preventive or corrective actions

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. principles of continuous learning and knowledge management
KU2. strategies pertinent to the field that can be used to pursue an advancement of skills
KU3. organisational policies on performance standards and task completion
KU4. methods for identifying training and development needs
KU5. problem-solving frameworks and techniques
KU6. quality assurance systems and key performance indicators (KPIs)
KU7. health, safety, and cybersecurity practices applicable to the work environment
KU8. types of workplace hazards (physical, electrical, digital, etc.) and emergency response protocols
KU9. ways to conserve energy, water, and materials during operations
KU10. routine maintenance procedures for tools, equipment, or digital infrastructure
KU11. environmental, social, and governance (ESG) principles relevant to workplace operations.

Generic Skills (GS)

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

GS1. apply strategies for continuous improvement in personal and team performance.
GS2. think critically and adapt to changing work scenarios
GS3. interpret feedback from superiors in a constructive way
GS4. communicate effectively with team members, supervisors, and stakeholders
GS5. organise and manage work plans, schedules, and deliverables
GS6. interpret and act on feedback for professional growth
GS7. escalate safety, operational, or ethical issues to the appropriate authority
GS8. promote inclusive and respectful team dynamics
GS9. take ownership of work outcomes and support team accountability

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Manage learning and self-direction	**7**	**9**	**-**	**2**
PC1. identify individual and team training needs relevant to current and emerging job roles	3	3	-	1
PC2. participate in learning activities and skill development programs	2	3	-	-
PC3. encourage team participation in professional development, cross-functional knowledge sharing, and upskilling initiatives.	2	3	-	1
Foster critical thinking and problem-solving	**6**	**6**	**-**	**1**
PC4. guide team members to analyse problems logically and identify root causes	2	2	-	-
PC5. suggest appropriate and timely solutions to operational challenges	2	2	-	1
PC6. enable the team to evaluate outcomes of decisions and refine processes accordingly.	2	2	-	-
Perform work as per quality and performance standards	**9**	**10**	**-**	**2**
PC7. organise individual and team work based on task priorities and deadlines	3	3	-	-
PC8. monitor performance to ensure quality, accuracy, and timely completion of tasks	2	3	-	-
PC9. allocate responsibilities and establish work schedules to optimise team productivity	2	2	-	1
PC10. implement systems to track adherence to standard operating procedures (SOPs)	2	2	-	1
Maintain a safe, secure, and healthy workplace	**8**	**11**	**-**	**3**
PC11. communicate safety policies and procedures clearly to all team members	2	3	-	1
PC12. address risks such as accidents, electrical hazards, cyber risks, or health incidents as per emergency protocols	2	3	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC13. report hazards, breaches, or incidents promptly to the designated authority	2	3	-	1
PC14. promote practices that support mental well-being and respectful workplace behaviour.	2	2	-	1
Implement sustainable and efficient resource usage practices	**10**	**14**	**-**	**2**
PC15. implement ways to optimise the usage of material, energy and water, in various tasks/activities/processes	2	3	-	-
PC16. encourage regular upkeep of tools, machinery, and digital assets to extend usability	2	2	-	-
PC17. ensure team compliance with environmentally responsible work practices	2	3	-	1
PC18. promote the use of energy-efficient systems and paperless documentation where feasible.	2	3	-	1
PC19. report and resolve malfunctions or wastage through preventive or corrective actions	2	3	-	-
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	1
Version	3.0
Last Reviewed Date	19/08/2025
Next Review Date	30/06/2028
NSQC Clearance Date	19/08/2025

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:

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.

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

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

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Introduction to Employability Skills	**1**	**1**	**-**	**-**
PC1. identify employability skills required for jobs in various industries	-	-	-	-
PC2. identify and explore learning and employability portals	-	-	-	-
Constitutional values – Citizenship	**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	-	-	-	-
Becoming a Professional in the 21st Century	**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	-	-	-	-
Basic English Skills	**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	-	-	-	-
Career Development & Goal Setting	**1**	**2**	**-**	**-**

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	-	-	-	-
Communication Skills	**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	-	-	-	-
Diversity & Inclusion	**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	-	-	-	-
Financial and Legal Literacy	**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	-	-	-	-
Essential Digital Skills	**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	-	-	-	-
Entrepreneurship	**2**	**3**	**-**	**-**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
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	**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	-	-	-	-
Getting ready for apprenticeship & Jobs	**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**	**-**	**-**

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	07/10/2025
Next Review Date	07/10/2028
NSQC Clearance Date	07/10/2025

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/N6610.Prepare for Development of ML-Based Telecom Network Intelligence Systems	30	60	-	10	100	22
TEL/N6611.Develop and Support Implementation of ML Solutions in Telecom Operations	30	60	-	10	100	22
TEL/N9103.Implement Effective Interaction at workplace	30	60	-	10	100	22
TEL/N9104.Manage Work, Resources and Safety at workplace	40	50	-	10	100	22
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	-	-	50	12
Total	**150**	**260**	**-**	**40**	**450**	**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.