Model Curriculum

QP Name: 5G System Integrator

QP Code: TEL/Q4202

Version: 1.0

NSQF Level: 5

Model Curriculum Version: 1.0

Telecom Sector Skill Council || 3rd Floor, Plot No 126, Sector – 44

Gurgaon - 122003

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Training Parameters

Sector	Telecom
Sub-Sector	Passive Infrastructure
Occupation	Network (Passive) Installation
Country	India
NSQF Level	5
Aligned to NCO/ISCO/ISIC Code	NCO-2015/2153.0400
Minimum Educational Qualification and Experience	Completed 2nd year of 3-years/4-years UG (Electronics/Telecom/IT and other relevant domains) with No Experience required **OR** Pursuing 2nd year of 3-years/4-years UG (Electronics/Telecom/IT and other relevant domains) and continuing education with No Experience required **OR** Completed 1st year of 3-years/4-years UG (Electronics/Telecom/IT and other relevant domains) with One year of Experience required **OR** Completed 3-year diploma (Electronics/ Telecom/IT and other relevant domains) after 10 with One year of Experience required **OR** 12th Grade pass with 2-year relevant experience
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	31-Aug-2023
Next Review Date	31-Aug-2026
NSQC Approval Date	31-Aug-2023
QP Version	1.0
Model Curriculum Creation Date	31-Aug-2023
Model Curriculum Valid Up to Date	31-Aug-2026
Model Curriculum Version	1.0
Minimum Duration of the Course	570 Hours
Maximum Duration of the Course	570 Hours

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner should have acquired the listed knowledge and skills to:

- Evaluate the availability of hardware equipment at a specified site location.
- Establish standards for designing a 5G network architecture.
- Create a comprehensive design for spectrum allocation and 5G network architecture.
- Implement 5G New Radio (NR) and Radio Access technologies
- Explain the importance of organising work and resources as per health and Safety standards.

Compulsory Modules

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

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
Bridge Module	**10:00**	**20:00**	**00:00**	**-**	**30:00**
Module 1: Introduction to the role of 5G System Integrator	10:00	20:00	00:00	-	30:00
TEL/N4205: Set Standards for 5G Network Architecture NOS Version-1.0 NSQF Level- 5	**50.00**	**40.00**	**60.00**	**-**	**150.00**
Module 2: Set Standards for 5G Network Architecture	50.00	40.00	60.00	-	150.00
TEL/N4206: Verify and Prepare Hardware Equipment for 5G Installation NOS Version-1.0 NSQF Level- 5	**30.00**	**30.00**	**30.00**	**-**	**90.00**
Module 3: Verify and Prepare Hardware Equipment for 5G Installation	30.00	30.00	30.00	-	90.00
TEL/N4207: Design Spectrum and 5G Network Architecture NOS Version-1.0 NSQF Level- 5	**40.00**	**50.00**	**30.00**	**-**	**120.00**

Module 4: Design Spectrum and 5G Network Architecture	40.00	50.00	30.00	-	120.00
TEL/N4208: Implement 5G New Radio (NR) and Radio Access NOS Version-1.0 NSQF Level- 5	**50.00**	**40.00**	**30.00**	**-**	**120.00**
Module 5: Implement 5G New Radio (NR) and Radio Access	50.00	40.00	30.00	-	120.00
DGT/VSQ/N0102: Employability Skills (60 Hours) NOS Version No. 1 NSQF Level- 4	**60:00**	**00:00**	**00:00**	**-**	**60:00**
Module 6: DGT/VSQ/N0102: Employability Skills (60 Hours)	60:00	00:00	00:00	-	60:00
Total Duration	**240:00**	**180:00**	**150:00**	**-**	**570:00**

Module Details

Module 1: Introduction to the role of 5G System Integrator

Bridge Module

Terminal Outcomes:

- Discuss the job role of 5G System Integrator.
- Explain the scope of work for 5G System Integrator.

Duration: 10:00	**Duration: 20:00**
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the size and scope of the Telecom industry and its sub-sectors. • Discuss the role and responsibilities of a 5G System Integrator. • Identify various employment opportunities for a 5G System Integrator. • Discuss the organisational policies on workplace ethics, managing sites, quality standards, personnel management and public relations (PR). • Describe the process workflow in the organization and the role of 5G System Integrator. • List the various daily, weekly, monthly operations/activities that take place at the site under 5G System Integrator.	• Role play based on case studies, outlining the scope, responsibilities, and challenges of 5G System Integrator. • Analyse the requirements for the course and prepare for the pre- requisites of the course.
Classroom Aids	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films	
Tools, Equipment and Other Requirements	
NA	

Module 2: Set Standards for 5G Network Architecture

Mapped to TEL/N4205, v1.0

Terminal Outcomes:

- Discuss the significance of implementing new networking technologies and protocols.
- Discuss about network performance, scalability, and reliability.

Duration: 50:00	Duration: 40:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Recall the technical specifications for 5G network elements, including base stations, core network components, and user equipment. • Explain the principles and fundamentals of 5G technology, such as beamforming, massive MIMO, and network slicing. • Describe the ITU's IMT-2020 framework and the specific frequency bands designated for 5G deployment. • Identify the 3GPP standards that define the technical specifications for 5G network elements and protocols. • Discuss the service-based architecture (SBA) and network function virtualization (NFV) for service delivery in 5G networks. • Describe different authentication methods like SIM-based authentication, AKA, and EAP methods for securing subscribers. • Explain the techniques for planning network coverage and capacity, including cell placement and interference management. • Discuss encryption methods, secure key exchange, and authentication protocols for network security. • Describe the implementation of voice over 5G (VoNR), IoT connectivity, and multimedia services in 5G networks. • Explain QoS mechanisms like bearer control, flow control, and resource reservation in 5G	• Design a 5G network architecture to support dynamic spectrum sharing between different operators and technologies. • Perform installation and configuration of base stations, RAN elements, and core network components based on network design. • Implement subscriber authentication and security mechanisms to ensure secure connectivity. • Conduct network planning activities to design the coverage and capacity of the 5G network. • Deploy network monitoring and analytics tools to continuously monitor network performance. • Identify and troubleshoot network issues, such as latency, packet loss, and throughput. • Implement Quality of Service (QoS) mechanisms to prioritize critical services and applications. • Evaluate the current capacity of the network infrastructure and identify areas where scalability is required. • Analyze traffic patterns and trends to understand the growth in network demand. • Develop interoperability standards to ensure seamless communication between different vendors' equipment and network elements. • Verify if the existing hardware and equipment can support the increased traffic

networks. • Discuss regulatory compliance regarding telecommunications standards and spectrum allocation policies. • Identify emerging networking technologies and advancements in the field of 5G	demands. • Perform testing and optimization activities to verify the network's performance and fine-tune configuration parameters. • Integrate network types for seamless connectivity, including cellular, Wi-Fi, and satellite networks. • Utilize monitoring tools like SNMP, NetFlow, and Deep Packet Inspection (DPI) to assess network performance. • Analyze network performance metrics and make informed decisions for updates and optimizations.
Classroom Aids	
Training Kit (Trainer Guide, Presentations), Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Projector, Whiteboard, Marker, Laptop, 5G Network Equipment, Spectrum Analyzer, Network Monitoring Tools, Handheld Devices, Simulation Software, Traffic Generators, QoS Testing Tools, Drive Testing Equipment, Network Planning Software, Authentication Protocols, Network Security Tools, Network Performance Testing Tools	

Module 3: Verify and Prepare Hardware Equipment for 5G Installation

Mapped to NOS TEL/N4206, v1.0

Terminal Outcomes:

- Demonstrate how to perform pre-installation analysis and preparation
- Discuss how to check equipment availability

Duration: 30:00	Duration: 30:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Recall 3GPP standards and specifications relevant to 5G network deployment. • Explain the principles and concepts of Multiple Input, Multiple Output (MIMO) technology. • Describe the functionality and technical requirements of passive equipment like antennas, feeders, and cables. • Discuss the functionality and technical requirements of active equipment such as gNodes and microwave link devices. • Summarize the procedures for validating and obtaining necessary licenses and permits for hardware installation. • Explain weatherproofing and protective measures to safeguard equipment from environmental elements. • Identify specific tools and equipment used for installation and configuration tasks. • Define the types of network cables, connectors, and interconnection standards used in 5G networks. • Describe grounding and lightning protection principles for equipment safety. • Discuss power supply and backup system requirements to support 5G hardware. • Explain mounting structures and hardware specifications for different installation scenarios. • Describe inventory management practices	• Demonstrate the ability to analyze 3GPP standards, budget, architectural, and other design documents for 5G network deployment. • Apply knowledge of MIMO antenna parameters to select appropriate configurations for 5G implementation. • Verify the availability of passive equipment and ensure its proper installation at the site. • Verify the availability of active equipment and ensure its proper installation at the site. • Validate the necessary licenses and permits for hardware installation and ensure compliance. • Inspect hardware equipment for weatherproofing and protective enclosures to meet environmental requirements. • Demonstrate the use of specialized equipment and tools for installation and configuration tasks. • Implement proper network cable and connector configurations for seamless interconnection. • Design and implement grounding and lightning protection systems for equipment safety. • Set up and test power supply and backup systems to support 5G hardware. • Demonstrate the installation of mounting structures and hardware for secure antenna placement. • Conduct a thorough inventory check and track

and techniques for equipment tracking. • Explain inspection techniques to identify damages or defects in hardware equipment. • Discuss health and safety regulations relevant to equipment installation and operation. • Summarize troubleshooting methodologies to address potential integration issues. • Describe the basics of network topology and architecture in 5G deployments. • Explain quality assurance and testing processes for hardware functionality and performance.	hardware items as per the deployment plan. • Perform equipment inspection to identify any damages or defects before installation. • Follow health and safety regulations during equipment installation and operation. • Troubleshoot potential integration issues and resolve them effectively. • Design and plan network topology and architecture for efficient 5G deployment. • Execute quality assurance and testing processes to verify hardware functionality and performance.
Classroom Aids:	
Training Kit (Trainer **G**uide, Presentations), Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Projector, Screen, Whiteboard, Markers, Laptops, Training Materials, Handouts, 5G Network Equipment (gNB, antennas, cables, etc.), Tools (e.g., screwdrivers, wrenches), Simulation Software, Spectrum Analyzer, Network Monitoring Tools, Safety Equipment (e.g., gloves, safety goggles), Power Supply/Battery Backup, Inventory Management System, Testing Equipment, Interconnection Components (network cables, connectors), Weatherproofing Materials, Lightning Protection Systems, Mounting Structures (towers, poles), Health and Safety Guidelines, Troubleshooting Guides.	

Module 4: Design Spectrum and 5G Network Architecture

Mapped to TEL/N4207, v1.0

Terminal Outcomes:

- Illustrate the importance of spectrum utilization and 5G network design.
- Elaborate the procedure of integration of network types for seamless connectivity

Duration: 40:00	Duration: 50:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Define the principles of wireless communication, including radio frequency (RF) propagation, modulation techniques, and spectral efficiency. • Explain the 3GPP standards and specifications for 5G networks, including frequency bands and channel access methods. • Describe the regulatory guidelines and spectrum allocation policies governing the use of wireless frequency bands for telecommunications. • Analyze the principles of radio wave propagation and its impact on coverage, interference, and capacity planning in wireless networks. • Apply techniques for spectrum analysis and measurement to assess spectrum availability and interference levels. • Utilize methods for frequency planning and resource allocation to meet the diverse requirements of 5G services and applications. • Evaluate network architecture and design principles for dynamic spectrum sharing and efficient coexistence of different operators and technologies. • Explain advanced spectrum management techniques, such as cognitive radio, spectrum sensing, and dynamic spectrum access. (KU8) • Interpret spectrum licensing and frequency coordination processes to comply with	• Define the principles of wireless communication, including radio frequency (RF) propagation, modulation techniques, and spectral efficiency. • Explain the 3GPP standards and specifications for 5G networks, including frequency bands and channel access methods. • Describe the regulatory guidelines and spectrum allocation policies governing the use of wireless frequency bands for telecommunications. • Analyze the principles of radio wave propagation and its impact on coverage, interference, and capacity planning in wireless networks. • Apply techniques for spectrum analysis and measurement to assess spectrum availability and interference levels. • Utilize methods for frequency planning and resource allocation to meet the diverse requirements of 5G services and applications. • Evaluate network architecture and design principles for dynamic spectrum sharing and efficient coexistence of different operators and technologies. • Explain advanced spectrum management techniques, such as cognitive radio, spectrum sensing, and dynamic spectrum access. (KU8) • Interpret spectrum licensing and frequency coordination processes to comply with

regulatory requirements and avoid interference. • Describe network slicing concepts and how to tailor virtual network instances for different services and user groups. • Understand the principles of network integration and interworking between different types of networks, including cellular, Wi-Fi, and satellite. • Discuss handover mechanisms and seamless mobility management across heterogeneous network environments. • Analyze quality of service (QoS) mechanisms and traffic engineering techniques for efficient resource allocation and prioritization. • Examine the role of Fully Qualified Domain Name (FQDN) in the 5G core network for efficient communication between network functions and services. • Explore security considerations and authentication mechanisms for seamless connectivity and roaming between integrated networks. • Understand evolving trends and developments in wireless communication technologies and spectrum management practices.	regulatory requirements and avoid interference. • Describe network slicing concepts and how to tailor virtual network instances for different services and user groups. • Understand the principles of network integration and interworking between different types of networks, including cellular, Wi-Fi, and satellite. • Discuss handover mechanisms and seamless mobility management across heterogeneous network environments. • Analyze quality of service (QoS) mechanisms and traffic engineering techniques for efficient resource allocation and prioritization. • Examine the role of Fully Qualified Domain Name (FQDN) in the 5G core network for efficient communication between network functions and services. • Explore security considerations and authentication mechanisms for seamless connectivity and roaming between integrated networks. • Understand evolving trends and developments in wireless communication technologies and spectrum management practices.
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Projector, Laptop, Whiteboard, Whiteboard markers, Flipcharts, Flipchart markers, Handouts, Training materials, Spectrum analysis software, Frequency planning tools, Network planning software, Spectrum analyzer, Interference measurement tools, 5G network equipment (base stations, antennas, routers), Spectrum management tools, Cognitive radio simulation software, Network simulation tools, Testing equipment, RF measurement devices, Network integration tools, QoS management tools, FQDN configuration software, Safety equipment, Training room, Internet connection, Training participants.	

Module 5: Implement the 5G New Radio (NR) and Radio Access

Mapped to TEL/N4208, v1.0

Terminal Outcomes:

- Discuss the importance of regularly updating the database
- Demonstrate 5G radio access detection

Duration: 50:00	Duration: 40:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the technical specifications and best practices for implementing robust network access control mechanisms in 5G networks to prevent unauthorized access and irregular data resources. • Explain the purpose and functions of firewalls and intrusion detection/prevention systems (IDS/IPS) in monitoring and filtering incoming and outgoing traffic in 5G networks. • Discuss the principles and benefits of content filtering mechanisms in blocking access to specific websites, domains, or IP addresses associated with foreign or irregular data resources. • Summarize the concepts and capabilities of traffic analysis tools and anomaly detection systems for monitoring network traffic patterns and identifying irregular or suspicious behavior in 5G networks. • Compare and contrast the utilization of deep packet inspection (DPI) techniques to analyze packet contents and identify foreign or irregular data resources based on specific protocols, signatures, or patterns in 5G networks. • Explain the importance of regular updates and patches for all network components, including routers, switches, firewalls, and security systems, to ensure the latest security measures are in place in 5G networks. • Describe the continuous monitoring and analysis of network traffic, security logs, and system events to detect and respond to any attempts to access or distribute foreign or irregular data resources in 5G networks. • Discuss the principles and concepts of 5G NR Physical Channels and Signals and their	• Show how to implement network access control mechanisms using suitable tools and equipment to secure the 5G system from unauthorized access and irregular data resources. • Deploy firewalls and intrusion detection/prevention systems (IDS/IPS) to monitor and filter network traffic and assess their effectiveness in mitigating threats in 5G networks. • Utilize content filtering mechanisms to block access to specific websites, domains, or IP addresses associated with foreign or irregular data resources in a practical network environment. • Employ traffic analysis tools and anomaly detection systems to monitor and analyze network traffic patterns for irregular or suspicious behavior in a simulated 5G network scenario. • Configure and operate specialized monitoring equipment to capture and analyze 5G NR physical channels and signals in a laboratory setting. • Conduct real-time monitoring of 5G NR physical channels and signals using monitoring equipment to capture dynamic changes and fluctuations in network performance. • Analyze resource allocation and scheduling mechanisms for downlink transmission in a practical 5G network setup. • Perform frequency analysis on captured signals to identify the frequency range of PSS and SSS signals in a simulated 5G network. • Demonstrate the process of synchronizing

significance in 5G network monitoring.
- Explain the acquisition and utilization of specialized monitoring equipment capable of analyzing 5G NR physical channels and signals for real-time monitoring and analysis.
- Summarize the steps involved in monitoring different 5G NR physical channels, such as the downlink and uplink channels, control channels, synchronization channels, and reference signals, to ensure proper functioning and performance.
- Describe the process of conducting real-time monitoring of the 5G NR physical channels and signals to capture dynamic changes and fluctuations in the network.
- Explain the methods for analyzing resource allocation and scheduling mechanisms used for downlink transmission in 5G networks.
- Discuss the identification and configuration of BWP Configuration in 5G networking for efficient resource utilization and management.
- Explain the role of Physical Layer Procedures in 5G networks and their impact on network performance and efficiency.
- Describe the procedures for Initial Access and Cell Search in 5G networks and their significance in maintaining network connectivity and coverage.
- Discuss the operations and procedures involved in PSS and SSS Detection in 5G networks for cell identification and synchronization.
- Explain the process of capturing received signals and performing frequency analysis to identify the frequency range where the PSS and SSS signals are expected to be present in 5G networks.
- Describe the implementation of error handling mechanisms to account for cases where the PSS or SSS signals are weak, corrupted, or not detected correctly in 5G networks.
- Discuss the continuous validation and verification of the accuracy and reliability of the PSS and SSS detection process in 5G networks.
- Illuminate on the implementation of 5G in an industrial 4.0 setting, such as manufacturing, production, transportation, and warehousing, and assess its impact on operations and efficiency.
- Elaborate how to implement 5G in various sectors, such as agriculture, entertainment, smart education, and public safety, and

received signals with the expected timing and frame structure of the 5G system using monitoring equipment in a laboratory environment.
- Apply suitable ways to implement error handling mechanisms to address weak, corrupted, or undetected PSS or SSS signals in a simulated 5G network.
- Use appropriate techniques to install and rectify analog and digital beamforming in a practical 5G network configuration.
- Inspect and configure beamforming settings to optimize beamforming performance in 5G networks.

evaluate its suitability for different applications and services.	
Classroom Aids	
Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop	
Tools, Equipment and Other Requirements	
Computer or Laptop, Projector or Smartboard, Internet connectivity, Network Performance Measurement and Analysis Tools, Network Access Control Mechanisms, Firewalls, Intrusion Detection/Prevention Systems (IDS/IPS), Content Filtering Mechanisms, Traffic Analysis Tools, Anomaly Detection Systems, Monitoring Equipment for 5G NR Physical Channels and Signals, Signal Capture Equipment, Frequency Analysis Tools, Error Handling Mechanisms, Channel Estimation and Equalization Tools, Demodulation and Decoding Tools, Analog Beamforming Equipment, Digital Beamforming Equipment, Monitoring Equipment for Beamforming Reconstruction, Beamforming Configuration Tools.	

Module 6: DGT/VSQ/N0102: Employability Skills (60 Hours)

Mandatory Duration: 60:00			
Location: On-Site			
S.No.	Module Name	Key Learning Outcomes	Duration(hours)
1.	Introduction to Employability Skills	• Discuss the Employability Skills required for jobs in various industries • List different learning and employability related GOI and private portals and their usage	1.5 Hours
2.	Constitutional values - Citizenship	• Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen • Show how to practice different environmentally sustainable practices.	1.5 Hours
3.	Becoming a Professional in the 21st Century	• Discuss importance of relevant 21st century skills. • Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life. • Describe the benefits of continuous learning.	2.5 Hours
4.	Basic English Skills	• Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone • Read and interpret text written in basic English • Write a short note/paragraph / letter/e -mail using basic English	10 Hours
5.	Career Development & Goal Setting	• Create a career development plan with well-defined short- and long-term goals	2 Hours
6.	Communication Skills	• Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette. • Explain the importance of active listening for effective communication • Discuss the significance of working collaboratively with others in a team	5 Hours
7.	Diversity & Inclusion	• Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders	2.5 Hours

		and PwD • Discuss the significance of escalating sexual harassment issues as per POSH act.	
8.	Basic English Skills	• Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone • Read and interpret text written in basic English • Write a short note/paragraph / letter/e -mail using basic English	10 Hours
9.	Career Development & Goal Setting	• Create a career development plan with well-defined short- and long-term goals	2 Hours
10.	Communication Skills	• Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette. • Explain the importance of active listening for effective communication • Discuss the significance of working collaboratively with others in a team	5 Hours
11.	Diversity & Inclusion	• Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD • Discuss the significance of escalating sexual harassment issues as per POSH act.	2.5 Hours
12.	Financial and Legal Literacy	• Outline the importance of selecting the right financial institution, product, and service • Demonstrate how to carry out offline and online financial transactions, safely and securely • List the common components of salary and compute income, expenditure, taxes, investments etc. • Discuss the legal rights, laws, and aids	5 Hours
13.	Essential Digital Skills	• Describe the role of digital technology in today's life • Demonstrate how to operate digital devices and use the associated applications and features, safely and securely • Discuss the significance of displaying responsible online behavior while browsing, using various social media platforms, e-mails, etc., safely and securely • Create sample word documents, excel sheets and presentations using basic features • Utilize virtual collaboration tools to work effectively	10 Hours
14.	Entrepreneurship	• Explain the types of entrepreneurship and enterprises	7 Hours

		• Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan • Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement • Create a sample business plan, for the selected business opportunity	
15.	Customer Service	• Describe the significance of analyzing different types and needs of customers • Explain the significance of identifying customer needs and responding to them in a professional manner. • Discuss the significance of maintaining hygiene and dressing appropriately	5 Hours
16.	Getting Ready for apprenticeship & Jobs	• Create a professional Curriculum Vitae (CV) • Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively • Discuss the significance of maintaining hygiene and confidence during an interview • Perform a mock interview • List the steps for searching and registering for apprenticeship opportunities	8 Hours

LIST OF TOOLS & EQUIPMENT FOR EMPLOYABILITY SKILLS		
S.No.	**Name of the Equipment**	**Quantity**
1.	Computer (PC) with latest configurations – and Internet connection with standard operating system and standard word processor and worksheet software (Licensed) (all software should either be latest version or one/two version below)	As required
2.	UPS	As required
3.	Scanner cum Printer	As required
4.	Computer Tables	As required
5.	Computer Chairs	As required
6.	LCD Projector	As required
7.	White Board 1200mm x 900mm	As required
Note: Above Tools &Equipment not required, if Computer LAB is available in the institute.		

Module 7: On-the-Job Training

Mapped to 5G System Integrator (TEL/4202, v1.0)

Mandatory Duration: 120:00	Recommended Duration: 00:00
Location: On-Site	

Terminal Outcomes

1. Implement robust network access control mechanisms on the field to secure the 5G system from unauthorized access and irregular data resources.
2. Deploy firewalls and intrusion detection/prevention systems (IDS/IPS) on-site to monitor and filter network traffic in real-world scenarios.
3. Perform installation and configuration of base stations, RAN elements, and core network components based on network design at actual deployment sites.
4. Conduct network planning activities on the field to design the coverage and capacity of the 5G network in real-world environments.
5. Integrate different network types, including cellular, Wi-Fi, and satellite networks, to ensure seamless connectivity on-site.
6. Utilize monitoring tools like SNMP, NetFlow, and Deep Packet Inspection (DPI) to assess network performance and troubleshoot issues in practical settings.
7. Analyze network performance metrics during on-site testing and optimization activities to verify the network's performance and fine-tune configuration parameters.
8. Verify if the existing hardware and equipment can support the increased traffic demands at real deployment sites.
9. Demonstrate the ability to inspect hardware equipment and identify damages or defects before installation while on the field.
10. Implement Quality of Service (QoS) mechanisms on-site to prioritize critical services and applications and ensure a reliable user experience in actual network conditions.
11. Deploy firewalls and intrusion detection/prevention systems (IDS/IPS) on-site to monitor and filter network traffic and assess their effectiveness in real-world scenarios.
12. Configure and operate specialized monitoring equipment to capture and analyze 5G NR physical channels and signals in a practical network environment.
13. Conduct real-time monitoring of 5G NR physical channels and signals using monitoring equipment to capture dynamic changes and fluctuations in network performance on-site.
14. Analyze resource allocation and scheduling mechanisms for downlink transmission in a practical 5G network setup during fieldwork.
15. Perform frequency analysis on captured signals to identify the frequency range of PSS and SSS signals in a real-world 5G network environment.
16. Demonstrate the process of synchronizing received signals with the expected timing and frame structure of the 5G system using monitoring equipment in the field.
17. Apply suitable techniques to install and rectify analog and digital beamforming on-site in a 5G network configuration.
18. Inspect and configure beamforming settings to optimize beamforming performance in 5G networks while working on the field.

19. Analyze network performance metrics and make informed decisions for updates and optimizations in real-world network conditions during OJT.
20. Demonstrate effective communication and interpersonal skills while interacting with colleagues and superiors, including escalating problems, reporting work completion, and receiving feedback.

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Graduate	Science/Electronics / Telecom/IT and other relevant domains	1	5G System	0	NA	Eligible forToT program

Trainer Certification	
Domain Certification	**Platform Certification**
Job Role "**5G System Integrator**", "TEL/4202, v1.0", Minimum accepted score is 80%	Trainer is certified for the job role "**Trainer (VET & SKILLS)"**; mapped to Qualification Pack: - "MEP/Q2601, V2.0" with minimum 80% of score.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training/Assessment Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
Graduate	Science/Electronics /Telecom/IT and other relevant domains	1	5G System	0	NA	Eligible forToA program

Assessor Certification	
Domain Certification	**Platform Certification**
Job Role "**5G System Integrator**", "TEL/Q4202, v1.0", Minimum accepted score is 80%	Assessor is certified for the job role **"Assessor (VET & SKILLS)"**; mapped to Qualification Pack: - "MEP/Q2701, V2.0" with minimum 80% of score.

Trainer Requirements (Employability Skills 60 hours)

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	**Specialization**	**Years**	**Specialization**	
Graduate/CITS	Any discipline			2	Teaching experience	Prospective ES trainer should: • have good communication skills • be well versed in English • have digital skills • have attention to detail • be adaptable • have willingness to learn
Current ITI trainers	Employability Skills Training (3 days full-time course done between 2019-2022)					
Certified current EEE trainers (155 hours)	from Management SSC (MEPSC)					
Certified Trainer	Qualification Pack: Trainer (MEP/Q0102)					

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

Master Trainer Requirements (Employability Skills 60 hours)

Master Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	**Specialization**	**Years**	**Specialization**	
Graduate/CITS	Any discipline			3	Employability Skills curriculum training experience with an interest to train as well as orient other peer trainers	Prospective ES trainer should: • have good communication skills • be well versed in English • have digital skills • have attention to detail • be adaptable • have willingness to learn
Certified Master Trainer	Qualification Pack: Master Trainer (MEP/Q2602			3	EEE training of Management SSC (MEPSC) (155 hours)	

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

Assessment Strategy

1. Assessment System Overview:
    - Batches assigned to the assessment agencies for conducting the assessment on SDSM/SIP oremail.
    - Assessment agencies send the assessment confirmation to VTP/TC looping SSC.
    - The assessment agency deploys the ToA certified Assessor for executing the assessment.
    - SSC monitors the assessment process & records.
2. Testing Environment:
    - Confirm that the centre is available at the same address as mentioned on SDMS or SIP.
    - Check the duration of the training.
    - Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
    - If the batch size is more than 30, then there should be 2 Assessors.
    - Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
    - Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
    - Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
    - Check the availability of the Lab Equipment for the particular Job Role.
3. Assessment Quality Assurance levels / Framework:
    - Question papers created by the Subject Matter Experts (SME).
    - Question papers created by the SME verified by the other subject Matter Experts.
    - Questions are mapped with NOS and PC.
    - Question papers are prepared considering that level 1 to 3 are for the unskilled & semi- skilled individuals, and level 4 and above are for the skilled, supervisor & higher management.
    - An assessor must be ToA certified & the trainer must be ToT Certified.
    - The assessment agency must follow the assessment guidelines to conduct the assessment.
4. Types of evidence or evidence-gathering protocol:
    - Time-stamped & geotagged reporting of the assessor from assessment location.
    - Center photographs with signboards and scheme-specific branding.
    - Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period.
    - Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos.
5. Method of verification or validation:
    - A surprise visit to the assessment location.
    - A random audit of the batch.
    - Random audit of any candidate.
6. Method for assessment documentation, archiving, and access:
    - Hard copies of the documents are stored.
    - Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage.

- Soft copies of the documents & photographs of the assessment are stored in the HardDrives.

Assessment Strategy (Employability Skills 60 hours)

The trainee will be tested for the acquired skill, knowledge and attitude through formative/summative assessment at the end of the course and as this NOS and MC is adopted across sectors and qualifications, the respective AB can conduct the assessments as per their requirements.

References

Glossary

Term	Description
Declarative Knowledge	Declarative knowledge refers to facts, concepts and principles that need tobe known and/or understood in order to accomplish a task or to solve a problem.
Key Learning Outcome	A key learning outcome is a statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. Aset of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT (M)	On-the-job training (Mandatory); trainees are mandated to completespecified hours of training on-site
OJT (R)	On-the-job training (Recommended); trainees are recommended the specified hours of training on-site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform atask. It is the ability to work or produce a tangible work output by applying cognitive, affective or psychomotor skills.
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do upon the completion of the training.
Terminal Outcome	The terminal outcome is a statement of what a learner will know, understand and be able to do upon the completion of a module. A set ofterminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

Term	Description
NOS	National Occupational Standard (s)
NSQF	National Skills Qualifications Framework
OJT	On-the-job Training
QP	Qualifications Pack
PwD	People with Disability
PPE	Personal Protective Equipment