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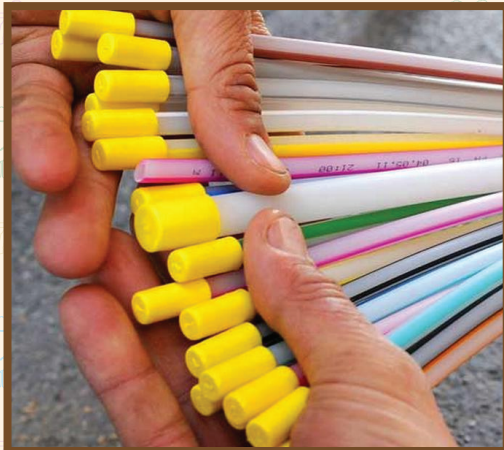


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Facilitator Guide



Sector
Telecom

Sub-Sector
Network Managed Services

Occupation
Network (Active Components) Installation

Reference ID: TEL/Q6213, Version 2.0
NSQF level 4

Technician 5G – Active Network Installation

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Telecom Sector Skill Council of India

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Shri Narendra Modi
Prime Minister of India

“ Skilling is building a better India.
If we have to move India towards
development then Skill Development
should be our mission. ”

Acknowledgements

The Telecom Sector Skill Council (TSSC) would like to thank all the individuals and institutions who contributed in various ways towards the preparation of this facilitator guide. The guide could not have been completed without their active contribution. Special gratitude is extended to those who collaborated during the development of the different modules in the facilitator guide. Wholehearted appreciation is also extended to all who provided peer review for these modules.

The preparation of this guide would not have been possible without the telecom industry's support. Industry feedback has been extremely beneficial since inception to conclusion, and it is with the industry's guidance that we have tried to bridge the existing skill gaps in the industry. This facilitator guide is dedicated to the aspiring youth, who desire to achieve special skills that will be a lifelong asset for their future endeavours.

About this Guide

The facilitator guide (FG) for Technician 5G – Active Network Installation is primarily designed to facilitate skill development and training of people, who want to become professional Technician 5G – Active Network Installations in various stores. The facilitator guide is aligned to the Qualification Pack (QP) and the National Occupational Standards (NOS) as drafted by the Sector Skill Council (TSSC) and ratified by National Skill Development Corporation (NSDC).

It includes the following National Occupational Standards (NOSs)-

1. TEL/N6104: Carry out rack-level installation
2. TEL/N6105: Carry out 5G active network installation
3. TEL/N6246: Follow the occupational health and safety instructions during tower climbing
4. TEL/N9101: Organise Work and Resources as per Health and Safety Standards
5. TEL/N9102: Interact Effectively with Team Members and Customers
6. DGT/VSQ/N0102 - Employability Skills (60 Hours)

Post this training, the participants will be able to perform tasks as professional Assistant Technician (Wireless). We hope that this Facilitator Guide provides a sound learning support to our young friends to build a lucrative career in the Telecom Skill Sector of our country.

Symbols Used



Ask



Explain



Elaborate



Notes



Objectives



Do



Demonstrate



Activity



Team Activity



Facilitation Notes



Practical



Say



Resources



Example



Summary



Role Play



Learning Outcomes

Table of Contents

S. No	Modules and Units	Page No
1.	Introduction to the Role of a 5G Technician – Active Network Installation (Bridge Module)	1
	Unit 1.1 - Job Role of a 5G Technician	3
	Unit 1.2 - Scope of Work for a 5G Technician	6
2.	Process of Carrying Out Rack-level Installation (TEL/N6104)	11
	Unit 2.1 - Preparing for the Installation of 5G Devices	13
	Unit 2.2 - Process of Carrying Out the Installation of 5G Devices	16
3.	Process of Carrying out 5G Active Network Installation (TEL/N6105)	21
	Unit 3.1 - Process of Carrying Out a Power, Earthling and RF Cabling	23
	Unit 3.2 - Process of Installation and Commissioning Backhaul Connectivity	26
4.	Process of Following the Occupational Health and Safety Instructions during Tower Climbing (TEL/N6246)	31
	Unit 4.1 - Pre-climbing Tower Inspection	33
	Unit 4.2 - Process of Checking the Safety Equipment and Work Site Conditions	36
	Unit 4.3 - Demonstrate the Process of Carrying out Tower Operations Following Safety Instructions	40
5.	Process of Organizing Work and Resources as per Health and Safety Standards (TEL/N9101)	45
	Unit 5.1 - Work as per Quality Standards	47
	Unit 5.2 - Maintaining a Safe, Healthy and Secure Working Environment	50
	Unit 5.3 - Conserving Material/ Energy/Electricity	53
	Unit 5.4 - Effective Waste Management/Recycling Practices	55
6.	Process of Interacting Effectively with Team Members and Customers (TEL/N9102)	59
	Unit 6.1 - Interaction with Supervisor, Peers and Customers	61
	Unit 6.2 - Gender and PwD Sensitization at Workplace	64



S. No	Modules and Units	Page No
7.	Employability Skills (DGT/VSQ/N0102) (60 Hrs.) Employability Skills is available at the following location : https://www.skillindiadigital.gov.in/content/list Scan the QR code below to access the ebook	67
8.	Annexures Annexure I: Training Delivery Plan Annexure II: Assessment Criteria Annexure III: List of QR Codes Used in PHB	69 70 85 92





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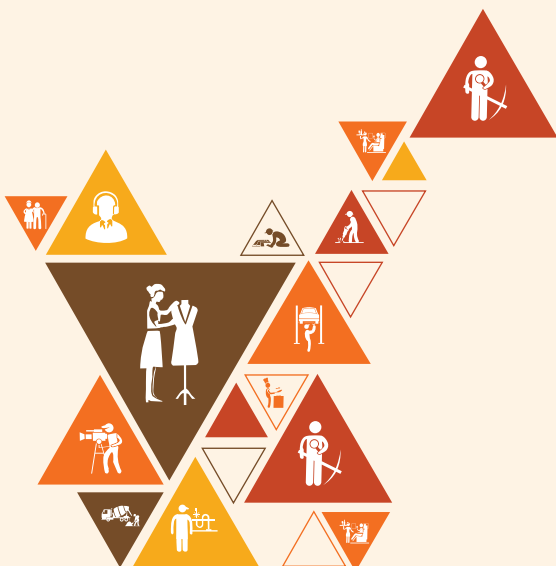
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1. Introduction to the Role of a 5G Technician – Active Network Installation

Unit 1.1 - Job Role of a 5G Technician

Unit 1.2 - Scope of Work for a 5G Technician



Bridge
Module

Key Learning Outcomes



By the end of this module, the participants will be able to:

1. Describe the size and scope of the Telecom industry and its sub-sectors.
2. Discuss the role and responsibilities of a 5G Technician – Active Network Installation.
3. Identify various employment opportunities for a 5G Technician – Active Network Installation.
4. Discuss the organisational policies on workplace ethics, managing sites, quality standards, personnel management and public relations (PR).
5. Role play based on case studies, outlining the scope, responsibilities, and challenges of a 5G Technician – Active Network Installation.
6. Creating and implementing functional computer networks, connections, and cabling.
7. Evaluate network performance and find ways of improvement.

Unit 1.1: Job Role of a 5G Technician

Unit Objectives

By the end of this unit, the participants will be able to:

1. Describe the size and scope of the Telecom industry and its sub-sectors.
2. Identify various employment opportunities for a 5G Technician – Active Network Installation.
3. Role play based on case studies, outlining the scope, responsibilities, and challenges of a 5G Technician – Active Network Installation.

Resources to be Used

Participant Handbook, Presentation slides or visual aids, Handouts or reference materials on the job role of a 5G Technician, Whiteboard or flipchart with markers, Laptop or computer for presentation, Projector or screen for displaying slides, Internet access (if needed for live demonstrations or additional resources)

Activity

1. **Name of the activity:** Name Game (Ice Breaker)
2. **Objective:** This activity is focused on breaking the ice between the participants so that they can come up confidently in putting forward their opinion
3. **Type of activity:** Group activity
4. **Resources:** Participant Handbook, Pen, Notebook, Writing Pad, etc.
5. **Duration of the activity:** 60 minutes
6. **Instructions:**
 - Arrange the class in a semi-circle/circle
 - Say your name aloud and start playing the game with your name.
 - Say, “Now, each of you shall continue with the game with your names till the last person in the circle/ semi-circle participates”.
 - Listen to and watch the trainees while they play the game.
 - Ask questions and clarify if you cannot understand or hear a trainee.
 - Discourage any queries related to one’s financial status, gender orientation or religious bias during the game
 - Try recognising each trainee by their name because it is not recommended for a trainer to ask the name of a trainee during every interaction
7. **Outcome:** This activity has focused on breaking the ice between the participants so that they can come up confidently, putting forward their opinion.

Say

- Participants welcome to the session of Job Role 5G Technicians.
- We will understand the job role of a 5G Technician and the responsibilities and challenges associated with it.

Ask

- What are some of the sub-sectors within the telecom industry?
- Can you name a few responsibilities of a 5G Technician?
- Why is it important for a 5G Technician to stay updated with emerging technologies?

Do

- Present an overview of the size of the telecom industry and its sub-sectors.
- Discuss the role and responsibilities of a 5G Technician, focusing on their involvement in the installation, maintenance, and troubleshooting of 5G networks and equipment.
- Explain the daily, weekly, and monthly operations/activities that take place at the site under a 5G Technician, highlighting tasks such as network monitoring, maintenance, and customer support.
- Discuss the responsibilities and challenges faced by 5G Technicians, including network reliability, performance optimization, and staying updated with emerging technologies.

Elaborate

5G technician's roles and responsibilities:

- Discuss the size of telecom industry and its sub sectors
- Explain the role and responsibilities of a 5G technician
- Explain the daily, weekly, monthly operations/activities that take place at the site under a 5G technician
- Make a list of the responsibilities and challenges of a 5G technician
- Make a list of the requirements of computer networks, connections, and cabling in 5G installation
- Discuss the software testing, configuration, hardware, and peripheral device maintenance and repair works done by a 5G technician

Demonstrate

Perform a demonstration showcasing the process of software testing and configuration related to 5G equipment, if feasible. Show examples of how a 5G Technician would handle such tasks.

Activity

1. **Name of the activity:** Role Play a Day in the Life of a 5G Technician
2. **Objective:** To simulate the responsibilities and challenges faced by a 5G Technician in a realistic scenario.
3. **Type of activity:** Group
4. **Resources:** Scenario handouts, pens, paper.
5. **Time Duration:** 30 minutes
6. **Instructions:**
 - Divide participants into small groups of 4-5 individuals each.
 - Distribute the scenario handouts to each group.
 - Instruct each group to read the scenario and assign roles to each group member, such as a 5G Technician, customer, and supervisor.
 - Allow time for the groups to discuss and plan how they would handle the situation described in the scenario, considering the responsibilities and challenges of a 5G Technician.
 - Allocate 20 minutes for group discussions and preparation.
 - Once the groups are ready, have them perform their role-plays, portraying the interactions between the 5G Technician, customer, and supervisor.
 - Encourage other groups to provide feedback and engage in discussions after each role-play.
 - Facilitate a debriefing session, highlighting the key learnings and insights from the activity.
7. **Outcome:** Participants actively engage in a role-play activity that simulates the job role of a 5G Technician and allows them to apply their knowledge in a practical scenario.

Notes for Facilitation

- Ensure a supportive and inclusive learning environment throughout the session.
- Encourage participants to ask questions and share their experiences or insights related to the topic.
- Provide additional examples or case studies to enhance understanding.
- Emphasize the importance of continuous learning and professional development in the field of 5G technology.
- Be prepared to address any technical questions or concerns raised by participants.

Unit 1.2: Scope of Work for a 5G Technician

Unit Objectives

By the end of this unit, the participants will be able to:

1. Identify various employment opportunities for a 5G Technician – Active Network Installation.
2. Evaluate network performance and find ways of improvement.
3. Demonstrate Software testing and configuration, as well as hardware and peripheral device maintenance and repair.

Resources to be Used

Participants handbook, Presentation slides or visual aids, Handouts or reference materials on the scope of work for a 5G Technician, Whiteboard or flipchart with markers, Laptop or computer for presentation, Projector or screen for displaying slides, Internet access (if needed for live demonstrations or additional resources)

Say

- Welcome to this session of ‘Scope of work for a 5G Technician’.
- In this session, we will understand the scope of work for a 5G Technician and the various aspects involved in their job role.

Ask

- What are some potential employment opportunities for a 5G Technician?
- How can a 5G Technician contribute to improving network performance?
- Why is long-term efficiency and troubleshooting crucial for 5G network stability?

Do

- Present the topics one by one, providing explanations and examples to enhance understanding.
- Encourage participants to ask questions and engage in discussions throughout the session.
- Use visual aids, handouts, and real-life scenarios to make the content more relatable.
- Conduct activities or group exercises to reinforce learning and promote active participation.
- Summarize each topic before moving on to the next one to ensure clarity and comprehension.

Elaborate

5G technician employment:

- Employment opportunities for a 5G Technician
- Network performance and ways of improvement in work structure for a 5G Technician
- Long-term efficiency and troubleshooting for system failures of 5G networks
- Organizational policies on workplace ethics, managing sites, quality standards, personnel management, and PR
- Career progression for a 5G Technician

Demonstrate

Demonstrate the process of network performance optimization, showcasing specific techniques or tools that a 5G Technician can utilize.

Activity

1. **Name of the activity:** Career Path Mapping
2. **Objective of the activity:** To encourage participants to explore and plan their career progression as 5G Technicians.
3. **Type of activity:** Individual
4. **Resources:** Career progression templates, pens, paper.
5. **Time Duration:** 30 minutes
6. **Instructions:**
 - Provide each participant with a career progression template.
 - Instruct them to fill in the template, mapping out their desired career path as a 5G Technician.
 - Encourage participants to consider various factors such as skills development, certifications, specialization, and industry trends.
 - Allocate 20 minutes for participants to complete their career progression templates.
 - Afterward, facilitate a discussion where participants can share their career paths and aspirations.
 - Encourage participants to provide feedback and insights on each other's career plans.
 - Wrap up the activity by highlighting the importance of continuous learning and adaptation in the dynamic field of 5G technology.
7. **Outcome:** Participants gain a clearer understanding of potential career paths and steps to progress as 5G Technicians.

Notes for Facilitation

- Foster an inclusive and supportive learning environment throughout the session.
- Encourage participants to actively engage in discussions and share their experiences or insights.
- Provide relevant examples and case studies to enhance understanding.
- Address any technical questions or concerns raised by participants.
- Highlight the significance of personal and professional development in the context of the scope of work for 5G Technicians.

Answers to Exercises for PHB

Multiple Choice Questions:

1. b. Broad and includes wireless communication, satellite communication, broadband, cable TV, etc.
2. c. Installation, configuration, and maintenance of active network equipment for 5G networks
3. c. Troubleshooting system failures and identifying bottlenecks for long-term efficiency
4. d. Installing and configuring network equipment for 5G networks
5. c. A basic understanding of computer networks and hardware

Descriptive Questions:

1. Refer to UNIT 1.1: Job Role of a 5G Technician
Topic 1.1.5 Responsibilities and challenges of a 5G Technician
2. Refer to UNIT 1.2: Scope of Work for a 5G Technician
Topic 1.2.1 Employment Opportunities for a 5G Technician
3. Refer to UNIT 1.2: Scope of Work for a 5G Technician
Topic 1.2.4 Organizational policies on workplace ethics, managing sites, quality standards, personnel management and public relations (PR)
4. Refer to UNIT 1.1: Job Role of a 5G Technician
Topic 1.1.3 Role and responsibilities of a 5G Technician
5. Refer to UNIT 1.1: Job Role of a 5G Technician
Topic 1.1.4 Daily, weekly, monthly operations/activities that take place at the site under a 5G Technician



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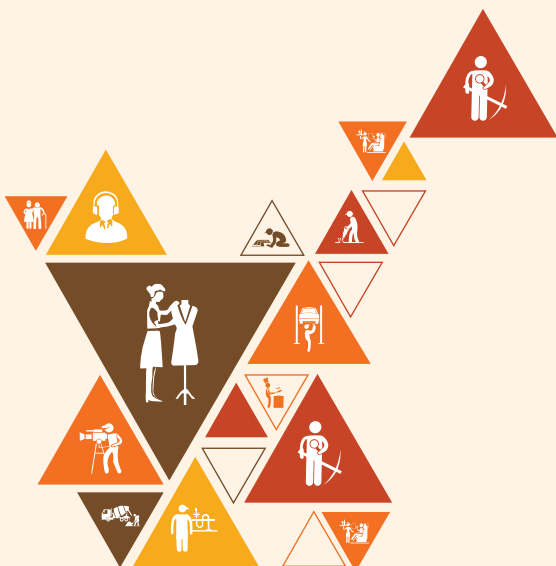
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2. Process of Carrying Out Rack-level Installation

Unit 2.1 - Preparing for the Installation of 5G Devices

Unit 2.2 - Process of Carrying Out the Installation of 5G Devices



TEL/N6104

Key Learning Outcomes



By the end of this module, the participants will be able to:

1. List different types of racks used for the installation of different types of IT equipment.
2. State the standard dimensions of racks, i.e., height, width, depth, and load rating.
3. State the standard dimensions of different types of IT equipment, such as servers, storage equipment, network switches, routers, telecommunications hardware, etc.
4. Explain different components of racks, such as doors, roof panels, side panels, locks, hinged wall brackets, casters, levellers, etc.
5. State the criteria for selecting a room/space for the installation of racks to house 5G network equipment.
6. List different types of racks used for the installation of 5G network equipment.
7. State the criteria for selecting appropriate types of racks for the safe placement of various 5G network equipment.
8. Explain the importance and process of ensuring the availability of correct voltages and sufficient amperage for all the 5G network equipment.
9. Explain the importance of ensuring that there are no sources of heat in and around the room selected for the installation of racks and equipment.
10. Explain the importance of ensuring adequate active or passive ventilation

Unit 2.1: Preparing for the Installation of 5G Devices

Unit Objectives

By the end of this unit, the participants will be able to:

1. List different types of racks used for the installation of different types of IT equipment.
2. State the standard dimensions of racks, i.e., height, width, depth, and load rating.
3. Explain the importance and process of ensuring the availability of correct voltages and sufficient amperage for all the 5G network equipment.
4. Describe the process of planning the placement of racks in relation to the room and important resources, such as power circuits and cooling equipment.

Resources to be Used

Presentation slides on different types of racks, dimensions, components, criteria for selecting a room, and installation process, Whiteboard or flipchart, Markers, Samples of different types of racks and equipment components, Room with racks and equipment (for demonstration purposes), Checklist for checking gNodeB damages and faults, Handouts with key points and guidelines

Say

- Hello everyone! Welcome to today's session on Preparing for the Installation of 5G Devices.
- You will learn about the different aspects of rack installation and ensure a smooth deployment of 5G infrastructure.
- By the end of this session, you will have a clear understanding of the various types of racks used, their dimensions, components, criteria for selecting a suitable room, the importance of managing heat sources, and the correct installation process. This knowledge will enable you to efficiently prepare for the installation of 5G devices.
- Understanding the intricacies of rack installation is crucial for a successful 5G deployment. A well-prepared installation process ensures proper functioning of the equipment, minimizes faults, and maximizes network performance. By mastering these concepts, you'll be equipped to contribute effectively to the installation process.

Do

- Familiarize the participants with the presentation slides and handouts.
- Set up the room or space for the session, ensuring that racks and equipment are available for demonstration purposes.
- Prepare the whiteboard or flipchart with the main topics to be covered during the session.
- Review the checklist for checking gNodeB damages and faults.
- Arrange the samples of different types of racks and equipment components in a visible and accessible manner.

Ask



- What do you understand by the term “rack” in the context of IT equipment installation?
- Why is it important to consider the dimensions of racks during the 5G installation process?
- Can you think of any potential sources of heat that should be avoided when selecting a room for rack installation?

Elaborate



Preparing for the Installation of 5G Devices:

- Explain different types of racks used for the installation of different types of it equipment
- Discuss the dimensions of racks that are required in the 5G installation process
- Explain the different components of racks
- Describe the criteria for selecting a room/space for the installation of racks
- Explain the importance of ensuring that there are no sources of heat in and around the room selected for the installation of racks and equipment
- Discuss the installation of equipment on racks
- Explain the process of checking gNodeB damages and faults
- Explain the placement of the racks in relation to the room and important resources

Demonstrate



Demonstrate the proper installation of equipment on racks using a sample rack and equipment components. Show how to secure the equipment and manage cable connections neatly.

Activity



1. **Name of the activity:** Rack Selection and Room Assessment
2. **Objective:** To apply the knowledge of rack types, dimensions, and room selection criteria to identify the most suitable rack and room setup for a hypothetical 5G installation project.
3. **Type of activity:** Group
4. **Resources:** Handouts, samples of racks and equipment components, room assessment checklist, markers.
5. **Time Duration:** 25 minutes
6. **Instructions:**
 - Divide participants into small groups.
 - Provide each group with a hypothetical scenario of a 5G installation project, including specific equipment requirements and room dimensions.
 - Instruct each group to select the appropriate rack type based on the equipment specifications and identify a suitable room based on the given dimensions and room assessment criteria.
 - Encourage group discussions and collaboration.
 - Ask each group to present their chosen rack and room setup, explaining their reasoning.

- Facilitate a brief discussion to compare and contrast the different solutions.
 - Summarize the key points and highlight best practices for rack selection and room assessment.
7. **Outcome:** Participants will gain practical experience in selecting the right rack and assessing a room for 5G installation projects. They will understand the considerations involved in choosing the appropriate equipment setup.

Notes for Facilitation

- Ensure active participation and engagement throughout the session.
- Encourage questions, discussions, and sharing of experiences.
- Create a positive and inclusive learning environment.
- Pace the session appropriately, allowing time for interactions and activities.
- Emphasize the importance of proper rack selection and room assessment for a successful 5G installation.
- Clarify any technical terms or concepts that may be unfamiliar to participants.
- Share real-life examples or case studies to reinforce key points.

Unit 2.2: Process of Carrying Out the Installation of 5G Devices

Unit Objectives

By the end of this unit, the participants will be able to:

1. Demonstrate the process of configuring the operating system with the VM ware.
2. List the common faults/malfunctions experienced with the 5G network equipment.
3. Explain networking fundamentals, such as Transmission Control Protocol (TCP)/ Internet Protocol (IP), Domain Name System (DNS), Secure Shell (SSH), Secure Sockets Layer (SSL), Hypertext Transfer Protocol (HTTP).

Resources to be Used

Participant handbook, Presentation slides on the topics covered, Whiteboard or flipchart with markers, Handouts or reference materials on networking fundamentals, Sample 5G devices, racks, and IT equipment (optional), Troubleshooting guide for 5G equipment (optional)

Say

- Good morning/afternoon, everyone! Welcome to today's session on the process of carrying out the installation of 5G devices.
- At the end of this session, you will have a comprehensive understanding of the installation process for 5G devices, including planning rack placement, ensuring necessary resources, networking fundamentals, equipment dimensions, troubleshooting, and more.
- Understanding the installation process is crucial for ensuring the successful deployment of 5G networks.
- By grasping these concepts, you will be equipped to handle various challenges that may arise during the installation and configuration of 5G devices.

Do

- Introduce the topics covered in the session, providing an overview of each one.
- Present the content using visual aids, such as slides or diagrams, to enhance understanding.
- Encourage participants to ask questions and participate actively throughout the session.
- Provide real-life examples or case studies related to the installation process to illustrate concepts.
- Conduct demonstrations or practical exercises to reinforce learning.

Ask

- What is the importance of planning the placement of racks in relation to the room?
- Why is it essential to ensure correct voltages and sufficient amperage for 5G network equipment?
- How does active or passive ventilation help dissipate heat generated by 5G equipment?

Elaborate

Planning and Infrastructure Considerations for 5G Network Equipment Placement:

- Discuss the process of planning the placement of racks in relation to the room.
- Explain the importance of 5G resources, such as power circuits and cooling equipment.
- Cover networking fundamentals relevant to the installation of 5G devices.
- Discuss the standard dimensions of different types of IT equipment.
- Describe the criteria for selecting appropriate types of racks for safe placement of 5G network equipment.

Infrastructure and Maintenance Efficient 5G Network Installations:

- Explain the importance and process of ensuring the availability of correct voltages and sufficient amperage for all 5G network equipment.
- Discuss the importance of maintaining an absence of heat in and around the installation room.
- Explain the significance of active or passive ventilation for heat dissipation.
- Describe the process of arranging racks in a hot-aisle/cold-aisle layout to reduce energy use.
- Cover the process of troubleshooting any faults or malfunctions of 5G equipment.
- Explain the process of configuring the operating system with VMware.
- Discuss the importance of placing heavy equipment at the bottom of racks.

Demonstrate

Demonstrate the process of arranging racks in a hot-aisle/cold-aisle layout to reduce energy use. Show how airflow can be optimized and heat dissipation improved through proper rack placement.

Activity

- 1. Name of the activity:** Rack Placement Simulation
- 2. Objective:** To apply the knowledge of rack placement principles in a practical scenario (group activity)
- 3. Resources:** Flipchart, markers, sample floor plan, cutouts of racks and equipment, tape
- 4. Time Duration:** 30 minutes
- 5. Instructions:**
 - Divide participants into small groups.
 - Provide each group with a sample floor plan and cutouts of racks and equipment.
 - Instruct the groups to plan the placement of racks in relation to the room, considering factors like airflow, heat dissipation, and equipment accessibility.
 - Encourage the groups to discuss and collaborate on their rack placement strategies.
 - Each group should present their proposed rack placement to the rest of the participants, explaining their reasoning and considerations.

- Facilitate a brief discussion on the pros and cons of each group's approach and provide feedback.
 - Summarize the key takeaways from the activity, emphasizing the importance of thoughtful rack placement for optimal 5G device installation.
- 6. Outcome:** Participants will gain hands-on experience in planning rack placement for 5G installations, applying the principles discussed during the session.

Notes for Facilitation

- Create a participatory and inclusive learning environment by actively engaging participants.
- Encourage open discussions and questions throughout the session to enhance understanding.
- Relate the content to real-world scenarios or examples to make it more relatable.
- Emphasize the importance of safety measures and adherence to installation standards.
- Provide additional resources or references for participants to explore further after the session.
- Remind participants of the significance of regular updates and staying up to date with the latest industry practices in 5G installation.

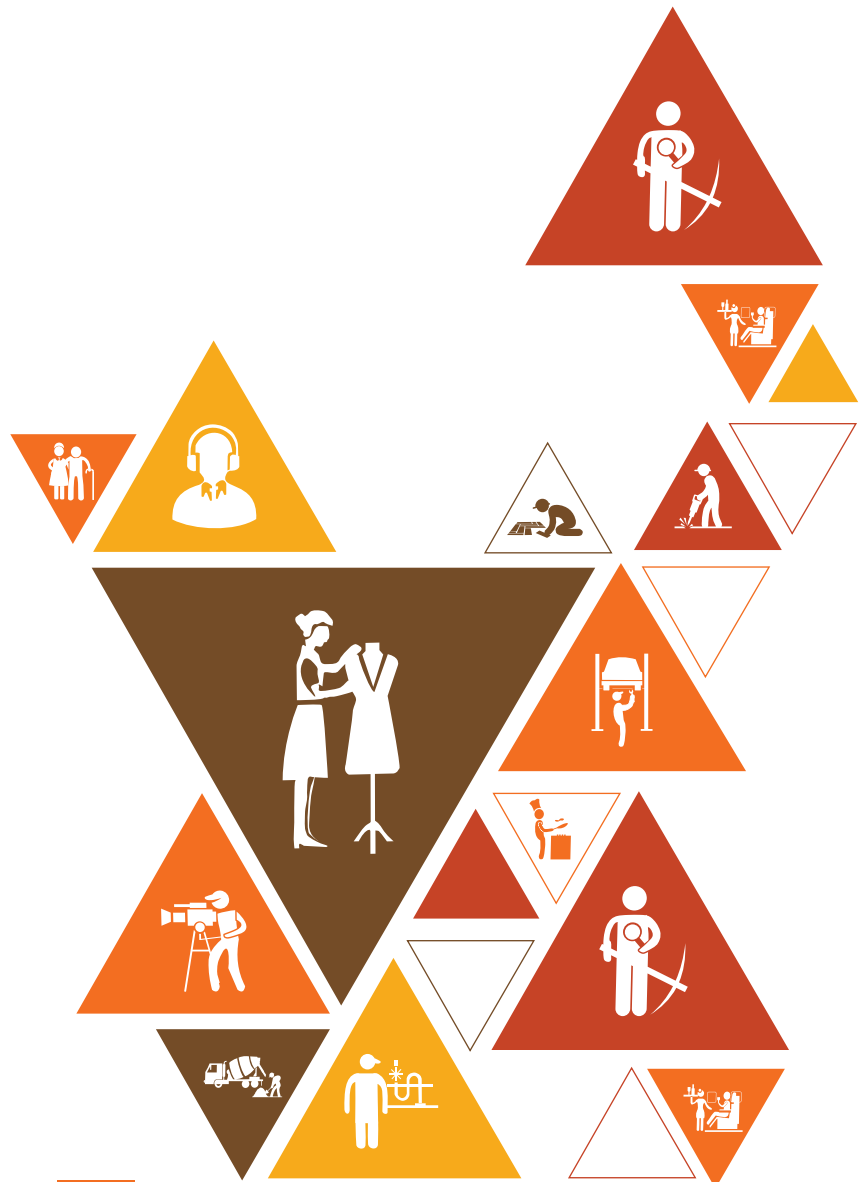
Answers to Exercises for PHB

Multiple Choice Questions:

1. c. Availability of correct voltages and sufficient amperage
2. d. Passive ventilation
3. b. Hot-aisle/cold-aisle layout
4. a. Overheating
5. a. 2000 lbs

Descriptive Questions:

1. Refer to UNIT 2.1: Preparing for the Installation of 5G Devices
Topic 2.1.1 Different Types of Racks Used for the Installation of Different Types of IT Equipment
2. Refer to UNIT 2.2: Process of Carrying Out the Installation of 5G Devices
Topic 2.2.1 Process of Planning the Placement of Racks in Relation to the Room
3. Refer to UNIT 2.2: Process of Carrying Out the Installation of 5G Devices
Topic 2.2.6 Importance and Process of Ensuring the Availability of Correct Voltages and Sufficient Amperage for All the 5G Network Equipment
4. Refer to UNIT 2.2: Process of Carrying Out the Installation of 5G Devices
Topic 2.2.10 Process of Carrying Out Troubleshooting for Any Faults/Malfunctions of 5G Equipment
5. Refer to UNIT 2.2: Process of Carrying Out the Installation of 5G Devices
Topic 2.2.3 Networking fundamentals





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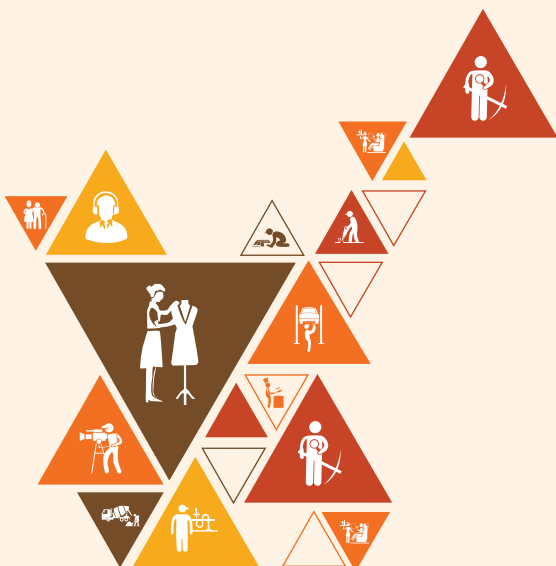
Transforming the skill landscape



3. Process of Carrying out 5G Active Network Installation

Unit 3.1 - Process of Carrying Out a Power, Earthling and RF Cabling

Unit 3.2 - Process of Installation and Commissioning Backhaul Connectivity



TEL/N6105

Key Learning Outcomes



By the end of this module, the participants will be able to:

1. Explain the importance of the 3rd Generation Partnership Project (3GPP) and their releases relevant to the 5G network.
2. Explain the constituent modules of 5G gNodeB and their functions.
3. Describe the process of determining the power requirements of the gNodeB and other equipment.
4. Explain the importance of making the gNodeB visible in the central unit so that commissioning commands can be given from the central unit.
5. Show how to create a Centralised Unit–Distributed Unit (CU-DU) split base station.
6. Show how to configure gNodeB to the Centralised Unit (CU).
7. Demonstrate the process of installing the appropriate Operating System (OS) and the Virtual Machine (VM) ware.

Unit 3.1: Process of Carrying Out a Power, Earthing and RF Cabling

Unit Objectives

By the end of this unit, the participants will be able to:

1. Explain the importance of the 3rd Generation Partnership Project (3GPP) and their releases relevant to the 5G network.
2. Explain the use of different types of power, earthing and RF cables.
3. Explain the importance of ensuring appropriate routing and termination of cables between omnidirectional and directional or sector antennas to allow their easy maintenance.
4. Demonstrate the process of installing power cables between the equipment and power source to ensure power supply to the equipment.
5. Demonstrate the process of installing earthing cables to the earth source.
6. Demonstrate the process of carrying out the installation of RF cables between gNodeB/ other equipment and the antennas on the cell tower.

Resources to be Used

Participant handbook, presentation slides on the topics covered, whiteboard or flipchart with markers, sample power, earthing, and RF cables, equipment and tools for cable installation demonstration, reference materials on 3GPP releases and cable installation guidelines

Say

- Hello everyone! Welcome to today's session on the process of carrying out power, earthing, and RF cabling. I will guide you through the essential steps involved in ensuring reliable and efficient connections in a 5G network.
- At the end of this session, you will understand the importance of 3GPP releases, the use of different types of cables, the significance of proper routing and termination, and how to install power, earthing, and RF cables in a 5G network.
- This knowledge will empower you to contribute to the successful deployment of 5G infrastructure.
- A solid understanding of power, earthing, and RF cabling is crucial for establishing a robust and high-performing 5G network.
- It ensures stable power supply, effective grounding, and seamless transmission of signals, which are vital for network reliability and performance.

Do

- Start the session by engaging participants in a brief discussion on their understanding of 3GPP and its relevance to 5G networks.
- Present the content using visual aids, slides, or diagrams to facilitate understanding.
- Explain the importance of proper earthing and demonstrate the process of installing earthing cables to ensure a safe and reliable electrical ground.
- Discuss the use of different types of RF cables and their specific applications in 5G networks.
- Encourage questions and foster active participation throughout the session.

Ask

- What is the purpose of 3GPP releases in the context of 5G networks?
- Why is it important to ensure proper routing and termination of cables between omnidirectional and directional/sector antennas?
- How does proper earthing contribute to the safety and reliability of a 5G network?

Elaborate

- Explain the importance of the 3rd Generation Partnership Project (3GPP) and their releases relevant to the 5G network.
- Describe the use of different types of power, earthing, and RF cables in a 5G network.
- Explain the importance of ensuring appropriate routing and termination of cables between omnidirectional and directional or sector antennas for easy maintenance.
- Discuss the process of installing power cables between equipment and power sources to ensure reliable power supply.

Demonstrate

Demonstrate the process of installing power cables between equipment and power sources, showcasing the correct connections and safety precautions.

Activity

1. **Name of the activity:** Cable Routing and Termination Simulation
2. **Objective:** To apply the knowledge of cable routing and termination in a practical scenario (group activity)
3. **Type of Activity:** Group
4. **Resources:** Sample floor plan, cable cutouts, tape, markers
5. **Time Duration:** 30 minutes

6. Instructions:

- Divide participants into small groups.
- Provide each group with a sample floor plan and cable cutouts.
- Instruct the groups to plan and route the cables between omnidirectional and directional/sector antennas, considering factors like maintenance, accessibility, and cable management.
- Each group should present their proposed cable routing and termination plan, explaining their reasoning and considerations.
- Facilitate a discussion among the groups to compare and evaluate the different approaches.
- Summarize the key takeaways from the activity, emphasizing the importance of proper cable routing and termination for easy maintenance and network efficiency.

7. Outcome: Participants will gain hands-on experience in planning cable routing and termination, applying the principles discussed during the session.

Notes for Facilitation

- Foster a collaborative and inclusive learning environment, encouraging active participation from participants.
- Relate the content to practical examples or real-life scenarios to enhance understanding.
- Emphasize the importance of following safety guidelines and industry standards when working with power, earthing, and RF cables.
- Provide additional resources or references for participants to explore further after the session.
- Encourage participants to ask questions and seek clarification throughout the session.
- Highlight the significance of regular updates and staying informed about the latest 3GPP releases and best practices in cable installation.

Unit 3.2: Process of Installation and Commissioning Backhaul Connectivity

Unit Objectives

By the end of this unit, the participants will be able to:

1. Explain the constituent modules of 5G gNodeB and their functions.
2. Describe the process of determining the power requirements of the gNodeB and other equipment.
3. Explain the importance of making the gNodeB visible in the central unit so that commissioning commands can be given from the central unit.
4. Demonstrate the process of establishing high throughput ethernet/ fiber based backhaul connectivity on the Ethernet interface.
5. Show how to use fiber optic for backhaul connectivity for the 5G network.
6. Demonstrate how to terminate the backhaul connectivity to ensure gNodeB is configurable and connected to the central office.
7. Show how to create a Centralised Unit–Distributed Unit (CU-DU) split base station.

Resources to be Used

Participant handbook, Presentation slides on the topics covered, Whiteboard or flipchart with markers, Sample gNodeB modules and equipment, Fiber optic cables and Ethernet cables, Tools for cable termination and connectivity demonstration, Reference materials on gNodeB architecture and backhaul connectivity guidelines

Say

- Welcome, everyone! Today, we're diving into the fascinating world of installing and commissioning backhaul connectivity for 5G networks.
- At the end of this session, you will understand the constituent modules of a 5G gNodeB, the process of determining power requirements, the significance of visibility between the gNodeB and central unit, and how to establish backhaul connectivity using Ethernet and fiber optic technologies.
- This knowledge will empower you to contribute to the successful installation and commissioning of backhaul connectivity in 5G networks.
- Understanding the process of installing and commissioning backhaul connectivity is crucial for creating a strong foundation for 5G networks.
- It ensures efficient data transfer, optimal performance, and seamless communication between network elements, ultimately enhancing the end-user experience.

Do 

- Begin the session by engaging participants in a discussion about the constituent modules of a 5G gNodeB and their respective functions.
- Present the content using visual aids, slides, or diagrams to enhance understanding.
- Describe the process of determining power requirements for the gNodeB and other associated equipment, emphasizing the importance of accurate power provisioning.
- Explain the significance of making the gNodeB visible in the central unit and the benefits of having commissioning commands transmitted from the central unit.
- Demonstrate the process of establishing high-throughput Ethernet/fiber-based backhaul connectivity on the Ethernet interface, highlighting key steps and considerations.

Ask 

- What are the main modules that make up a 5G gNodeB, and what are their functions?
- Why is it important to determine the power requirements of the gNodeB and other equipment accurately?
- How does making the gNodeB visible in the central unit facilitate commissioning commands and operations?

Elaborate 

Installation and Configuration of 5G gNodeB Equipment:

- Explain the constituent modules of 5G gNodeB and their functions.
- Describe the process of determining the power requirements of the gNodeB and associated equipment.
- Explain the importance of making the gNodeB visible in the central unit to enable commissioning commands and seamless operations.
- Demonstrate the process of establishing high-throughput Ethernet/fiber-based backhaul connectivity on the Ethernet interface.
- Show how to use fiber optic cables for backhaul connectivity in a 5G network.
- Demonstrate how to terminate the backhaul connectivity to ensure proper configuration and connection to the central office.
- Explain the concept and process of creating a Centralized Unit-Distributed Unit (CU-DU) split base station.

Demonstrate 

Demonstrate the process of terminating backhaul connectivity, showcasing proper cable termination techniques and ensuring the gNodeB is correctly connected to the central office.

Activity

1. **Name of the activity:** Power Requirements Calculation
2. **Objective:** To apply the knowledge of determining power requirements for gNodeB and associated equipment (individual activity)
3. **Type of Activity:** Individual
4. **Resources:** Sample gNodeB modules, power requirement guidelines, calculators
5. **Time Duration:** 25 minutes
6. **Instructions:**
 - Distribute sample gNodeB modules and provide participants with power requirement guidelines.
 - Ask participants to calculate the total power requirements for the given gNodeB configuration.
 - Participants can use calculators or other tools to perform the calculations.
 - After completing the calculations, ask participants to compare their results and discuss any discrepancies or challenges faced.
 - Facilitate a group discussion to review the correct approach and key considerations when determining power requirements for gNodeB.
7. **Outcome:** Participants will gain hands-on experience in calculating power requirements for gNodeB and understand the importance of accurate power provisioning.

Notes for Facilitation

- Encourage active participation and discussion throughout the session.
- Provide real-world examples and practical scenarios to enhance understanding.
- Emphasize the importance of adhering to industry standards and best practices in backhaul connectivity installation.
- Offer additional resources or references for participants to explore further on gNodeB installation and commissioning.
- Address any questions or concerns raised by participants promptly.
- Highlight the significance of proper visibility and connectivity between gNodeB and the central unit for effective commissioning and operation.

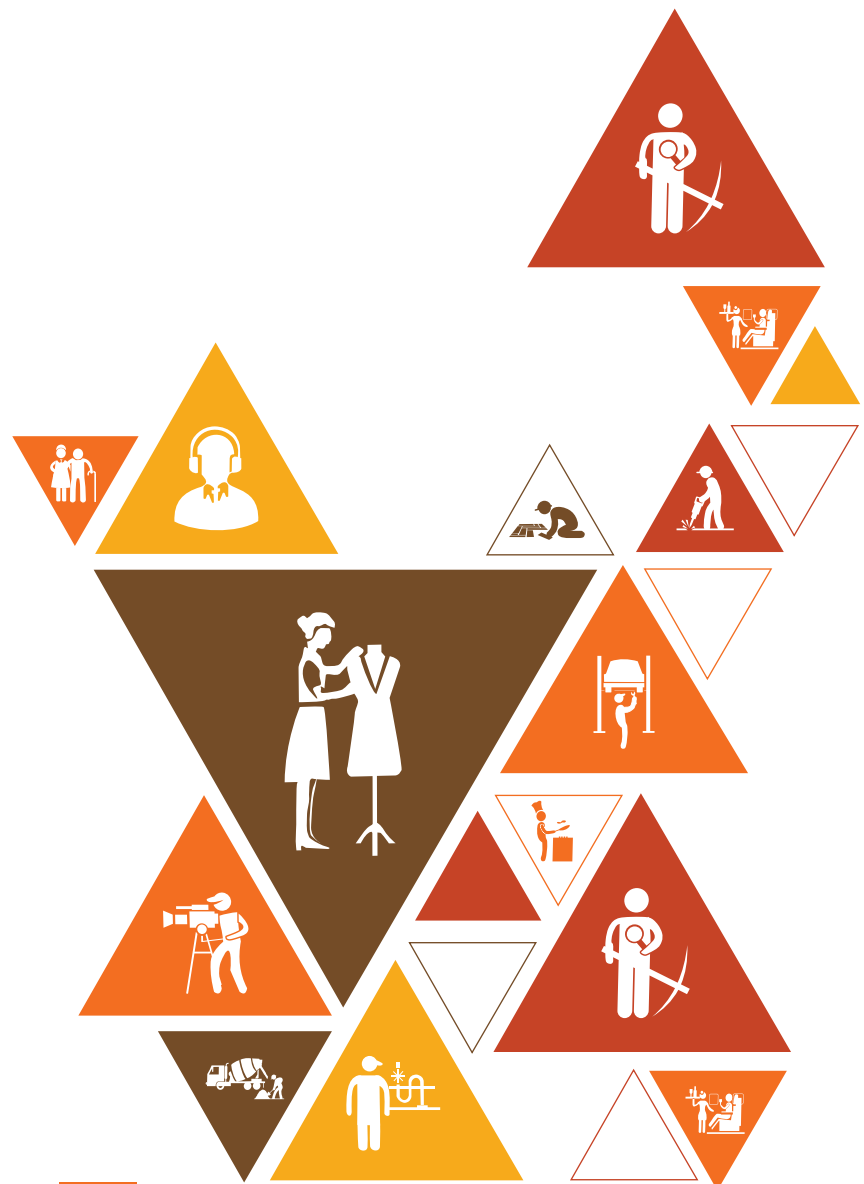
Answers to Exercises for PHB

Multiple Choice Questions:

1. a. To develop and maintain the technical specifications of the network
2. c. Central unit, distributed unit, Ethernet interface, power supply
3. b. By calculating the power requirements of each component based on its specifications
4. a. To prevent interference between the different types of antennas
5. b. To allow the central unit to monitor and control the gNodeB

Descriptive Questions:

1. Refer to UNIT 3.1: Process of Carrying Out A Power, Earthling and RF Cabling
Topic 3.1.5 Importance of the 3rd Generation Partnership Project (3GPP) and their releases relevant to the 5G network
2. Refer to UNIT 3.1: Process of Carrying Out A Power, Earthling and RF Cabling
Topic 3.2.8 Constituent Modules of 5G gNodeB and Their Functions
3. Refer to UNIT 3.1: Process of Carrying Out A Power, Earthling and RF Cabling
Topic 3.2.9 Process of Determining the Power Requirements of the gNodeB and Other Equipment
4. Refer to UNIT 3.1: Process of Carrying Out A Power, Earthling and RF Cabling
Topic 3.1.7 Importance of Ensuring Appropriate Routing and Termination of Cables Between Omnidirectional and Directional or Sector Antennas to Allow Their Easy Maintenance
5. Refer to UNIT 3.1: Process of Carrying Out A Power, Earthling and RF Cabling
Topic 3.2.10 The Importance of Making The gNodeB Visible in the Central Unit So That Commissioning Commands Can Be Given from The Central Unit





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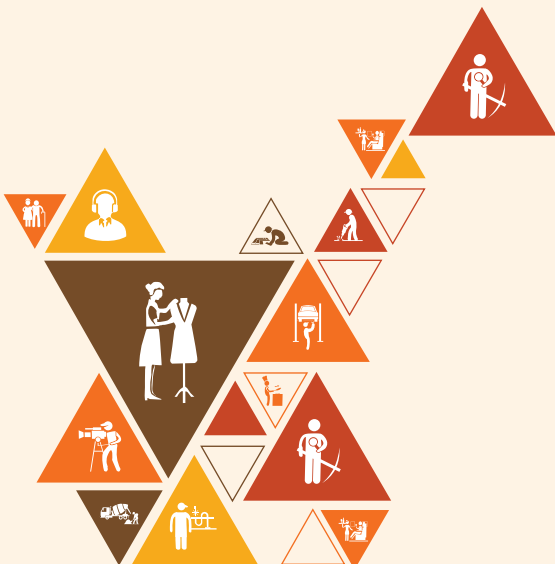


4. Process of Following the Occupational Health and Safety Instructions during Tower Climbing

Unit 4.1 - Pre-climbing Tower Inspection

Unit 4.2 - Process of Checking the Safety Equipment and Work Site Conditions

Unit 4.3 - Demonstrate the Process of Carrying out Tower Operations Following Safety Instructions



TEL/N6246

Key Learning Outcomes



By the end of this module, the participants will be able to:

1. Describe the process of performing the pre-climb tower inspection.
2. Describe the process of checking the safety equipment and work site conditions.
3. Demonstrate the process of carrying out tower operations following safety instructions.
4. Explain the importance of not working at heights in case of impaired physical health, such as being under medication that may cause drowsiness affecting the ability to work with concentration at elevations.
5. Explain the importance of continually enhancing safety skills and awareness through regular training.
6. Describe the process of conducting inspections of tools, hoisting and rigging equipment, and other machinery

Unit 4.1: Pre-climbing Tower Inspection

Unit Objectives

By the end of this unit, the participants will be able to:

1. Explain the importance of getting adequate training and practice in tower climbing to minimise the injuries and untoward incidents during tower climbing.
2. Explain the importance of ensuring the availability of well-maintained safety equipment before climbing towers.
3. List various PPE required for tower climbing.
4. Explain the importance of ensuring the availability of a fully-equipped first aid kit at the work site.
5. Demonstrate how to use binoculars to check for loose or missing hardware.
6. Show how to use a full-body harness tied off at appropriate spots on the tower to maintain complete tie-off while on the tower.
7. Demonstrate the use of a safety cable climb or two or more lanyards.

Resources to be Used

Participant handbook, Presentation slides on tower climbing safety and pre-climbing inspection, Visual aids, such as images or videos demonstrating safety equipment and procedures, Sample personal protective equipment (PPE), Binoculars, Full-body harness and safety cable climb or lanyards, First aid kit, Reference materials on tower climbing safety guidelines and inspection procedure

Say

- Welcome, everyone! Today, we're diving into an important aspect of tower climbing and pre-climbing tower inspection.
- By understanding the significance of thorough inspections and proper safety measures, we can minimize the risk of injuries and incidents while working at heights.
- At the end of this session, you will understand the importance of adequate training and practice in tower climbing, the necessity of well-maintained safety equipment, the various PPE required for tower climbing, and how to perform a pre-climbing tower inspection.
- This knowledge will empower you to prioritize safety and make informed decisions before ascending a tower.
- Understanding pre-climbing tower inspection is crucial for your safety and the safety of others working at heights.
- It ensures that you have the necessary knowledge and tools to identify potential hazards, maintain safety equipment, and mitigate risks. By investing time in pre-climbing inspection, you can proactively prevent accidents and create a secure working environment.

Do

- Begin the session by engaging participants in a discussion about the importance of tower climbing training and practice to minimize injuries and incidents.
- Present the content using visual aids, slides, or videos to enhance understanding.
- Explain the significance of ensuring the availability of well-maintained safety equipment before climbing towers, emphasizing the importance of equipment inspection and maintenance.
- List various PPE required for tower climbing, discussing the purpose and proper usage of each item.
- Explain the importance of having a fully-equipped first aid kit at the work site and highlight the essentials it should contain.
- Show how to use a full-body harness tied off at appropriate spots on the tower to maintain complete tie-off while on the tower.

Ask

- Why is it important to undergo adequate training and practice in tower climbing?
- What are some essential personal protective equipment (PPE) required for tower climbing?
- Why is it crucial to perform a pre-climbing tower inspection before ascending?

Elaborate

Pre-climbing training:

- Explain the importance of getting adequate training and practice in tower climbing to minimize injuries and untoward incidents during tower climbing.
- Describe the significance of ensuring the availability of well-maintained safety equipment before climbing towers.
- List various PPE required for tower climbing, highlighting their purpose and usage.
- Explain the importance of ensuring the availability of a fully-equipped first aid kit at the work site.
- Explain how to use binoculars to check for loose or missing hardware during tower inspection.
- Show how to use a full-body harness tied off at appropriate spots on the tower to maintain complete tie-off while on the tower.
- Explain the use of a safety cable climb or two or more lanyards for fall protection.

Demonstrate

Demonstrate the process of using binoculars to inspect a tower, identifying any loose or missing hardware.

Activity

1. **Name of the activity:** PPE Inspection and Maintenance
2. **Objective:** To reinforce the importance of well-maintained safety equipment and proper inspection (individual or small group activity)
3. **Type of Activity:** Group
4. **Resources:** Sample PPE, inspection checklist
5. **Time Duration:** 30 minutes
6. **Instructions:**
 - Provide participants with sample PPE items, such as harnesses, helmets, and safety glasses.
 - Distribute an inspection checklist that covers essential inspection points for each PPE item.
 - Instruct participants to perform a thorough inspection of the provided PPE, using the checklist as a guide.
 - Encourage participants to discuss their findings, identify any potential issues or defects, and suggest corrective actions.
 - Facilitate a group discussion to review the importance of PPE inspection and maintenance, addressing any questions or concerns raised.
 - Conclude the activity by emphasizing the role of regular inspection and maintenance in ensuring the effectiveness of safety equipment.
7. **Outcome:** Participants will gain practical experience in inspecting and maintaining PPE, reinforcing the importance of proper equipment care and inspection.

Notes for Facilitation

- Maintain an encouraging and supportive atmosphere throughout the session.
- Emphasize the significance of continuous training, practice, and adherence to safety protocols in tower climbing.
- Encourage participants to actively engage in discussions and share their experiences related to tower climbing safety.
- Highlight the specific PPE required for tower climbing and the importance of wearing them correctly.
- Discuss industry standards and guidelines related to tower climbing safety and pre-climbing tower inspection.
- Address any participant concerns or questions regarding tower climbing safety, equipment, or inspection procedures.

Unit 4.2: Process of Checking the Safety Equipment and Work Site Conditions

Unit Objectives

By the end of this unit, the participants will be able to:

1. Explain the benefit and importance of using two-way radio for telecom riggers to maintain communication with ground crew.
2. Explain the importance of identifying unsafe conditions at the work site and reporting them promptly to the appropriate authority following the applicable reporting process.
3. Explain the importance of checking the availability of relevant PPE and not undertaking any rigging work without PPE.
4. Explain the importance and process of checking the PPE to ensure it is functioning properly and safe to use.
5. Explain the importance of conducting comprehensive safety planning, including a Job Hazard Analysis (JHA) and an Emergency Action Plan (EAP) for every job site.
6. Explain the importance and process of checking weather conditions and avoiding any work at heights during adverse weather conditions.
7. Demonstrate the use of the appropriate PPE while climbing up and down and working on towers.

Resources to be Used

Participant handbook, Presentation slides on telecom riggers' safety equipment and work site conditions, Visual aids, such as images or videos demonstrating safety equipment and procedures, Sample two-way radio, Sample PPE items for demonstration, Job Hazard Analysis (JHA) and Emergency Action Plan (EAP) templates, Reference materials on safety reporting processes and weather conditions guidelines

Say

- Welcome, everyone! Today, we'll delve into the crucial process of checking safety equipment and work site conditions.
- As telecom riggers, it's vital to prioritize your safety and the safety of others.
- By understanding the importance of effective communication, identifying unsafe conditions, checking PPE, conducting safety planning, and considering weather conditions, we can create a secure work environment.
- We will explore these topics together to enhance our safety practices.
- At the end of this session, you will understand the significance of using two-way radios for communication, recognizing unsafe work site conditions, checking and using relevant PPE, conducting comprehensive safety planning, and considering weather conditions.
- This knowledge will empower you to maintain a safe work environment and minimize risks during telecom rigging.

- Understanding the process of checking safety equipment and work site conditions is essential for your safety and the smooth execution of telecom rigging tasks.
- It enables effective communication, helps you identify potential hazards, ensures the proper functioning of safety equipment, and allows you to plan for emergencies. By comprehending these topics, you can actively contribute to a safer work environment.

Ask

- Why is effective communication through two-way radios important for telecom riggers?
- What are the benefits of conducting comprehensive safety planning, including a Job Hazard Analysis and an Emergency Action Plan?
- Why is it crucial to check and ensure the proper functioning of PPE before performing rigging tasks?

Do

- Begin the session by asking participants the three basic questions to stimulate their interest and activate their prior knowledge.
- Present the content using visual aids, slides, or videos to enhance understanding.
- Explain the benefits and importance of using two-way radios for telecom riggers to maintain communication with the ground crew.
- Emphasize the significance of identifying unsafe conditions at the work site and promptly reporting them following the applicable reporting process.
- Explain the importance of checking the availability of relevant PPE and not undertaking any rigging work without it.
- Describe the importance and process of checking PPE to ensure it functions properly and is safe to use.

Elaborate

Checking safety equipment:

- Explain the benefits and importance of using two-way radios for effective communication among telecom riggers and ground crew.
- Discuss the importance of identifying and reporting unsafe conditions at the work site, following the appropriate reporting process.
- Explain the significance of checking the availability and proper use of relevant PPE before conducting rigging work.
- Describe the process of checking PPE to ensure its functionality and safety.

Checking worksite condition:

- Explain the importance of conducting comprehensive safety planning, including a Job Hazard Analysis (JHA) and an Emergency Action Plan (EAP) for every job site.
- Discuss the importance of considering weather conditions and avoiding work at heights during adverse weather conditions.
- Explain the correct use of appropriate PPE while climbing and working on towers.

Demonstrate

Demonstrate the proper use of a full-body harness and other PPE while climbing up and down towers.

Activity

1. **Name of the activity:** Group discussion and Quiz of JHA
2. **Activity type:** Group
3. **Objective:** To practice conducting a Job Hazard Analysis (JHA) for a specific telecom rigging task.
4. **Resources:** JHA template, relevant equipment and task description
5. **Time Duration:** 30 minutes
6. **Instructions:**
 - Divide participants into small groups.
 - Provide each group with a JHA template, a specific telecom rigging task description, and relevant equipment details.
 - Instruct the groups to work together and fill out the JHA template, identifying potential hazards, assessing risks, and suggesting control measures for the given task.
 - Allocate sufficient time for the groups to complete their JHA.
 - Once the time is up, ask each group to present their JHA findings and recommendations to the rest of the participants.
 - Facilitate a discussion to compare and analyze the different approaches and control measures proposed by each group.
 - Conclude the activity by highlighting the importance of conducting a thorough JHA and collaboratively addressing safety concerns in the telecom rigging process.
7. **Outcome:** Participants will gain practical experience in conducting a Job Hazard Analysis (JHA) and understanding the importance of identifying and mitigating risks in telecom rigging tasks.

Notes for Facilitation

- Create an inclusive and supportive environment that encourages active participation and open discussion.
- Emphasize the significance of effective communication and timely reporting of unsafe conditions in maintaining a safe work site.
- Provide real-life examples or case studies related to safety incidents to illustrate the importance of the topics covered.
- Discuss industry standards and guidelines for safety equipment, reporting processes, and weather condition considerations.
- Address any participant concerns or questions regarding safety equipment, work site conditions, or safety planning procedures.

Unit 4.3: Demonstrate the Process of Carrying out Tower Operations Following Safety Instructions

Unit Objectives

By the end of this unit, the participants will be able to:

1. Explain the importance of not working at heights in case of impaired physical health, such as being under medication that may cause drowsiness affecting the ability to work with concentration at elevations.
2. Explain the importance of continually enhancing safety skills and awareness through regular training.
3. Describe the process of conducting inspections of tools, hoisting and rigging equipment, and other machinery.
4. Explain the applicable electrical health and safety standards.
5. State the appropriate climbing and working practices to be adopted for a range of telecom structures, such as towers, poles and other steel structures.
6. Explain the applicable health and safety standards and regulations.
7. Explain the importance and process of preparing and reviewing incident reports for tower climbing incidents to avoid any similar incidents in future.
8. Demonstrate the process of administering first aid for different types of medical emergencies.

Resources to be Used

Participant handbook, Presentation slides on tower operations and safety instructions, Visual aids, such as images or videos demonstrating safe work practices, Sample incident report templates, First aid supplies and equipment for demonstration, Reference materials on applicable health and safety standards and regulations

Say

- Hello, everyone! Today, we'll be focusing on the process of carrying out tower operations while following safety instructions.
- This chapter is essential as it covers various aspects of safety, including physical health considerations, ongoing training, inspections, electrical safety standards, appropriate climbing and working practices, incident reporting, and first aid administration.
- By understanding and applying these safety measures, we can ensure a secure working environment and reduce the likelihood of accidents or incidents.
- At the end of this session, you will understand the importance of physical health in tower operations, the significance of ongoing training, the process of conducting inspections, applicable electrical health and safety standards, appropriate climbing and working practices, incident reporting procedures, and administering first aid for different medical emergencies.
- This knowledge will empower you to carry out tower operations safely and effectively.

- It's crucial for all telecom riggers to comprehend and follow safety instructions when carrying out tower operations.
- By recognizing the importance of physical health, continually enhancing safety skills through training, conducting thorough inspections, adhering to electrical safety standards, adopting appropriate climbing and working practices, effectively reporting incidents, and having the knowledge to administer first aid, you contribute to a safer working environment and protect yourself and your colleagues from potential harm.

Do

- Begin the session by asking participants three basic questions to stimulate their interest and activate their prior knowledge.
- Present the content using visual aids, slides, or videos to enhance understanding.
- Explain the importance of not working at heights when physically impaired or under medication that may affect concentration.
- Emphasize the significance of regular training to enhance safety skills and awareness.

Ask

- Why is it important to consider physical health when working at heights?
- How does ongoing training contribute to safety in tower operations?
- Why is it necessary to conduct inspections of tools, equipment, and machinery before performing tower operations?

Elaborate

Tower and Safety Operation:

- Explain the importance of physical health and its impact on safety when working at heights.
- Discuss the significance of ongoing training in keeping safety skills and awareness up to date.
- Describe the step-by-step process of conducting inspections for tools, hoisting and rigging equipment, and other machinery to ensure their safe operation.
- Explain the relevant electrical health and safety standards applicable to tower operations and their importance in maintaining a safe work environment.
- State the appropriate climbing and working practices for different types of telecom structures, emphasizing safety considerations.
- Explain the process of preparing and reviewing incident reports for tower climbing incidents, highlighting the importance of identifying and addressing potential risks.
- Explain the correct process of administering first aid for different types of medical emergencies commonly encountered in tower operations.

Demonstrate

Demonstrate the correct procedure for administering first aid for a simulated medical emergency, such as performing CPR or applying basic wound care.

Activity

1. **Name of the activity:** Safety checklist review
2. **Objective:** To conduct a safety checklist review and identify potential hazards in a tower operation scenario.
3. **Type of Activity:** Group
4. **Resources:** Safety checklist templates, tower operation scenario descriptions, pens or markers
5. **Time Duration:** 30 minutes
6. **Instructions:**
 - Divide participants into small groups.
 - Provide each group with a tower operation scenario description and a safety checklist template.
 - Instruct the groups to review the scenario and use the safety checklist to identify potential hazards and safety concerns.
 - Allocate sufficient time for the groups to complete their safety checklist review.
 - Once the time is up, ask each group to present their findings, discussing the identified hazards and suggested control measures.
 - Facilitate a group discussion to compare and analyze the different perspectives and solutions proposed by each group.
 - Conclude the activity by emphasizing the importance of conducting thorough safety checks and proactively addressing potential hazards in tower operations.
7. **Outcome:** Participants will gain practical experience in conducting safety checklist reviews and identifying potential hazards in tower operation scenarios. They will develop an understanding of the importance of proactive hazard identification and control measures.

Notes for Facilitation

- Create an inclusive and supportive environment that encourages active participation and open discussion.
- Reinforce the importance of ongoing training and continuous improvement in safety practices.
- Provide real-life examples or case studies related to tower operations and incident reports to enhance engagement and understanding.
- Familiarize yourself with applicable health and safety standards and regulations to address participant questions effectively.
- Highlight the importance of effective incident reporting and encourage participants to actively contribute to incident prevention and safety improvement.

Answers to Exercises for PHB

Multiple Choice Question

1. b. To minimize injuries and untoward incidents during tower climbing
2. c. To minimize injuries and untoward incidents during tower climbing
3. b. Helmets, harnesses, and lanyards
4. c. To minimize injuries and untoward incidents during tower climbing
5. c. To maintain communication with the ground crew

Descriptive Questions:

1. Refer to UNIT 4.1: Pre-climbing Tower Inspection
Topic 4.1.3 PPE for Tower Climbing
2. Refer to UNIT 4.2: Process of Checking the Safety Equipment and Work Site Conditions
Topic 4.2.5 The Importance of Conducting Comprehensive Safety Planning, Including A Job Hazard Analysis (JHA) and An Emergency Action Plan (EAP) for Every Job Site
3. Refer to UNIT 4.2: Process of Checking the Safety Equipment and Work Site Conditions
Topic 4.2.2 The importance of Identifying Unsafe Conditions at the Work Site and Reporting Them Promptly to the Appropriate Authority Following the Applicable Reporting Process
4. Refer to UNIT 4.2: Process of Checking the Safety Equipment and Work Site Conditions
Topic 4.2.6 The Importance and Process of Checking weather Conditions and Avoiding Any Work at Heights during Adverse Weather Conditions
5. Refer to UNIT 4.3: Demonstrate the Process of Carrying out Tower Operations Following Safety Instructions
Topic 4.3.4 The Applicable Electrical Health and Safety Standards for Telecom Technician



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Transforming the skill landscape



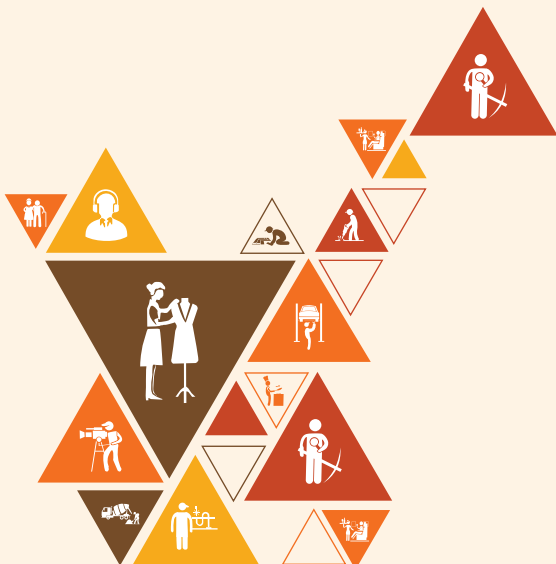
5. Process of Organizing Work and Resources as per Health and Safety Standards

Unit 5.1 - Work as per Quality Standards

Unit 5.2 - Maintaining a Safe, Healthy and Secure Working Environment

Unit 5.3 - Conserving Material/Energy/Electricity

Unit 5.4 - Effective Waste Management/Recycling Practices



TEL/N9101

Key Learning Outcomes



By the end of this module, the participants will be able to:

1. Explain the importance of performing work as per quality standards.
2. Explain the importance of maintaining a safe, healthy and secure working environment.
3. Explain the importance of conserving material/energy/electricity.
4. Describe the process of using effective waste management/recycling practices.

Unit 5.1: Work as per Quality Standards

Unit Objectives

By the end of this unit, the participants will be able to:

1. Explain various strategies pertinent to their field that can be used to pursue advancement in their skills.
2. State key performance indicators for the new tasks.
3. Describe feedback processes and formats.
4. Explain timelines and goals as well as their relevance to work allocated.
5. Demonstrate how to record/document tasks completed as per the requirements within specific timelines.
6. Explain the escalation matrix and its importance, especially in case of emergencies.
7. Show how to analyse problems accurately and communicate different possible solutions to the problem.
8. Explain various ways of time and cost management

Resources to be Used

Presentation slides, handouts of the session objectives, real-life examples of quality standards in different industries, flipchart or whiteboard with markers, safety equipment (e.g., goggles, gloves, earplugs, etc.)

Say

- Good day, everyone! I'm excited to explore the vital topic of performing work as per quality standards with you today. This session is all about enhancing your understanding of why quality matters in your work.
- Our goal today is to understand the importance of quality standards in our work and how it impacts not only our performance but also the overall success of our organization.
- By grasping the significance of quality standards, you'll be better equipped to excel in your tasks and contribute to the success of your team and organization.

Ask

- What's an example of a time when you received a product or service that didn't meet your quality expectations? How did it make you feel?
- Can you think of a scenario where poor-quality work could lead to serious consequences in your field?
- Have you ever been in a situation where you had to report a safety concern or breach? What was it, and how was it handled?

Do

- Share real-life examples of quality standards in various industries.
- Conduct a group discussion to identify key performance indicators (KPIs) relevant to the trainees' specific tasks.
- Demonstrate the proper use of safety equipment.
- Discuss and illustrate the importance of accurate problem analysis and communication.

Elaborate

- Explain the strategies for pursuing skill advancement in a field
- Discuss the key performance indicators for new tasks for employees
- State the feedback processes and formats
- Explain the concept of timelines and goals and their relevance to work allocated
- Explain the importance of quality and timely delivery of the product/service
- Discuss the escalation matrix and its importance, especially in case of emergencies
- Define the various ways of time and cost management
- Recording/documenting tasks completed as per requirements within specific timelines
- Explain the proper use of safety materials and handling hazardous materials
- Discuss about the importance of routine cleaning of tools, machines, and equipment

Demonstrate

Demonstrate the correct use of safety materials like goggles, gloves, and earplugs. Emphasize the importance of wearing them to ensure personal safety and compliance with safety standards.

Activity

1. **Activity name:** Analyzing Quality Standards
2. **Objective:** To understand the importance of quality standards and how they relate to various top-ics covered in this chapter.
3. **Type of Activity:** Group
4. **Resources:** Handouts of real-life quality standards examples, flipchart, markers
5. **Time Duration:** 30 minutes
6. **Instructions:**
 - Divide participants into small groups.
 - Provide each group with handouts of real-life quality standards examples from different indus-tries.
 - Instruct each group to discuss and identify the key quality standards in the examples provided.
 - Ask each group to present their findings on the flipchart, discussing how these standards relate to the topics covered in this chapter.
 - Encourage a discussion among all participants on the importance of these standards in their work.
7. **Outcome:** Participants will have a deeper understanding of quality standards and how they ap-ply to the topics discussed in the chapter.

Notes for Facilitation

- Encourage active participation and discussion among participants.
- Use real-life examples and stories to illustrate key points.
- Emphasize the importance of safety measures and compliance with safety policies.
- Share success stories related to quality work and its positive impact on career growth.
- Highlight the organization's specific quality standards and their relevance to participants' roles.

Unit 5.2: Maintaining a Safe, Healthy and Secure Working Environment

Unit Objectives

By the end of this unit, the participants will be able to:

1. Explain the meaning of hazard, different types of health and safety hazards found in the workplace, risks and threats based on the nature of work.
2. Demonstrate how to report any identified breaches in health, safety, and security policies and procedures to the designated person.
3. Demonstrate the process of using safety materials such as goggles, gloves, earplugs, caps, ESD pins, covers, boots, etc.
4. Demonstrate the process of handling heavy and hazardous materials with care, while maintaining appropriate posture.
5. Describe the organisation's procedures for different emergency situations and the importance of following the same.
6. Describe different methods of cleaning, disinfection, sterilisation, and sanitisation.
7. Explain the relevant signage, warnings, labels or descriptions on equipment, etc. while carrying out work activities.
8. Explain the significance of personal hygiene practice including hand hygiene.
9. Explain the path of disease transmission.

Resources to be Used

Presentation slides on workplace health and safety regulations, visual aids depicting different workplace hazards, safety equipment and PPE (personal protective equipment), emergency response procedures and documentation, cleaning and sanitization materials, hand hygiene products and demonstration equipment, diagrams illustrating disease transmission, telecom PPE for demonstration

Say

- Good day, everyone! I hope you're all doing well. Today, we have an essential topic to discuss – the importance of maintaining a safe, healthy, and secure working environment.
- At the end of this session, you will understand the significance of workplace safety and how it relates to your well-being.
- Knowing how to maintain a safe and secure workplace not only ensures your safety but also contributes to a more productive and efficient work environment.

Ask

- What safety precautions do you take in your daily life?
- Can you share an example of a health or safety hazard you've encountered at work or elsewhere?
- How do you think maintaining a safe working environment benefits both employees and the organization?

Elaborate

- Explain workplace regulations and rules
- State ways to identification of different hazards
- Discuss the proper use of safety equipment and emergency procedures
- Define personal hygiene and disease transmission

Do

- Begin with an interactive discussion about workplace health and safety regulations, involving participants in sharing their knowledge and experiences.
- Conduct a hazard identification exercise. Show various workplace hazard images and ask participants to identify them and discuss potential risks.
- Demonstrate the correct use of safety equipment and PPE, allowing participants to try them on and ask questions.
- Explain emergency response procedures, such as fire drills and evacuation plans, and emphasize the importance of following them.

Activity

1. **Activity name:** Hazard Hunt
2. **Objective:** To identify workplace hazards and discuss risk mitigation.
3. **Type of Activity:** Group
4. **Resources:** Visual aids of workplace hazards, notepads, and pens.
5. **Time Duration:** 30 minutes
6. **Instructions:**
 - Divide participants into small groups.
 - Provide each group with images of workplace hazards.
 - Ask them to identify the hazards, assess the risks, and suggest preventive measures.
 - Each group presents their findings and solutions to the class.
 - Discuss and emphasize the importance of proactive hazard identification.
7. **Outcome:** This activity helps participants better understand the chapter by working together and engaging in interactive learning.

Notes for Facilitation



- Encourage active participation and questions.
- Maintain a positive and engaging atmosphere.
- Emphasize that following safety regulations is a shared responsibility.
- Highlight the relevance of hazard identification to daily work tasks.
- Stress the importance of practicing personal hygiene, especially hand hygiene, in preventing disease transmission.

Unit 5.3: Conserving Material/ Energy/Electricity

Unit Objectives

By the end of this unit, the participants will be able to:

1. Explain different ways of managing resources and material efficiently.
2. Explain common electrical problems and common practices of conserving electricity.
3. Demonstrate ways to optimise the use of electricity/energy in various tasks/activities/processes.
4. Demonstrate the process of performing periodic checks of the functioning of the equipment/ machine and rectify it wherever required.
5. Demonstrate ways to use electrical equipment and appliances properly.

Resources to be Used

Whiteboard and markers, Projector and screen, Handouts on common electrical problems and conservation practices, Examples of common electrical equipment, Energy usage calculator, Props for practical demonstration, Flipchart or poster for activity instructions

Say

- Hello everyone! Welcome to today's session on the importance of conserving material, energy, and electricity. I'm excited to explore this crucial topic with you.
- Our objective today is to understand why conserving material, energy, and electricity is essential in our daily lives and how we can contribute to it.
- At the end of this session, you'll not only be able to identify common electrical problems and conservation practices but also know how to optimize the use of electricity and perform periodic equipment checks. This knowledge will empower you to make a positive impact on resource conservation.

Ask

- What are some common electrical problems you have encountered at home or work?
- Can you share examples of how you conserve electricity in your daily routine?
- Have you ever faced a situation where inefficient energy use led to problems or inconveniences?

Do

- Start with an interactive discussion on common electrical problems and conservation practices.
- Share practical tips on optimizing electricity usage.
- Demonstrate how to perform a basic periodic equipment check.
- Engage participants in group discussions and activities related to conserving energy.

Elaborate

- Explain ways of managing resources and material efficiently
- Discuss common electrical problems and common practices of conserving electricity
- State the ways of optimizing the use of electricity/energy in various tasks/activities/processes
- Discuss the process of performing periodic checks of the functioning of the equipment/machine and rectify wherever required
- Highlight the ways to use electrical equipment and appliances properly

Activity

1. **Activity name:** Energy Efficiency Challenge
2. **Objective:** To apply knowledge of energy conservation in a fun and competitive way.
3. **Type of Activity:** Group
4. **Resources:** Energy usage calculator, props for practical demonstration
5. **Time Duration:** 30 minutes
6. **Instructions:**
 - Divide participants into teams.
 - Each team is given a room with various electrical appliances.
 - They must identify and implement energy-saving measures within the room.
 - Use the energy usage calculator to track improvements.
 - The team that reduces energy consumption the most wins.
7. **Outcome:** Participants will gain practical experience in identifying and implementing energy-saving measures, fostering a deeper understanding of energy conservation.

Notes for Facilitation

- Encourage active participation and discussions.
- Be patient and open to questions.
- Emphasize the economic and environmental benefits of resource conservation.
- Highlight the importance of safety when performing equipment checks.
- Discuss local and regional energy-saving initiatives and incentives.

Unit 5.4: Effective Waste Management/Recycling Practices

Unit Objectives

By the end of this unit, the participants will be able to:

1. Explain the categorisation of waste into dry, wet, recyclable, non-recyclable and items of single-use plastics and the use of different colours of dustbins.
2. Describe the organisation's procedures for minimising waste.
3. Demonstrate the process of disposing of non-recyclable and hazardous waste as per recommended processes.
4. State common sources of pollution and ways to minimise them

Resources to be Used

Participant Handbook, Whiteboard, Marker, Notepad, Pens, Flipchart and markers, Pictures of different types of waste, Samples of recyclable and non-recyclable waste, Samples of hazardous waste and materials for their proper disposal, set of colour-coded waste bins, Company waste management policy and procedures

Do

- Introduce the topic and explain the session objectives.
- Engage the trainees with interactive discussions, practical demonstrations, and engaging activities.
- Ensure that the participants understand the key concepts and can apply them in real-life situations.
- Provide opportunities for questions and feedback.
- Summarise the session's main points and reiterate the importance of effective waste management and recycling practices.

Say

- Welcome, everyone. In this session, we will learn about effective waste management and recycling practices that can help reduce our environmental footprint and contribute to sustainable development.
- We will discuss different types of waste, recycling processes, and hazardous waste management procedures.
- We will also explore the company's waste management policy and procedures and learn how to apply them in our work.

Ask

- What is the most common type of waste generated in your workplace?
- How can you differentiate between recyclable and non-recyclable waste?

Elaborate

- Explain the different types of waste and their classification into dry, wet, recyclable, non-recyclable, and single-use plastics items. We will also discuss the use of different colours of dustbins for effective waste segregation.
- Explore the company's procedures for minimising waste, including the 3Rs (reduce, reuse, recycle) and each employee's role in waste management.
- Illustrate the process of disposing of non-recyclable and hazardous waste as per recommended processes to ensure safety and environmental protection.
- Discuss the common sources of pollution, including air, water, and soil pollution, and ways to minimise them through effective waste management and recycling practices.

Demonstrate

- Demonstrate the proper handling and disposal of hazardous waste, including chemicals, batteries, and electronic waste.
- Demonstrate the use of colour-coded waste bins for effective waste segregation.

Activity

1. **Activity name:** Waste Sorting Challenge
2. **Type:** Group Activity
3. **Objective of the activity:** To practice waste segregation and identify the common mistakes made in the process.
4. **Resources:** Samples of recyclable and non-recyclable waste, colour-coded waste bins
5. **Time Duration:** 30 minutes
6. **Instructions:**
 - Divide the trainees into small groups of 3-4 people.
 - Provide each group with a set of samples of recyclable and non-recyclable waste and colour-coded waste bins.
 - Instruct the groups to sort the waste into the appropriate bins quickly and accurately.
 - Once the sorting is complete, ask each group to present their results and discuss any common mistakes made.
 - Provide feedback and tips for improvement.
7. **Outcome:** The participants will practice waste segregation and identify the common mistakes made in the process. They will also learn how to improve their waste-sorting skills and contribute to effective waste management.=

Notes for Facilitation

- Emphasise the importance of effective waste management and recycling practices for environmental protection and sustainable development.
- Encourage trainees to share their experiences and ideas on waste management and recycling practices in their workplace.
- Provide practical examples and case studies to illustrate the key concepts and reinforce the learning outcomes.

Answers to Exercises for PHB

Multiple Choice Questions:

1. d. All of the above
2. d. All of the above
3. d. All of the above
4. a. Air, water, and soil
5. d. All of the above

Descriptive Questions:

1. Refer to UNIT 5.4: Effective Waste Management/Recycling Practices
Topic 5.4.3 Colour Codes of Waste Collecting Bins
2. Refer to UNIT 5.1: Work as per Quality Standards
Topic 5.1.2 Key Performance Indicators for the New Tasks
3. Refer to UNIT 5.2: Maintaining a Safe, Healthy and Secure Working Environment
Topic 5.2.1 Hazards
4. Refer to UNIT 5.2: Maintaining a Safe, Healthy and Secure Working Environment
Topic 5.2.4 Handling Heavy Materials with Care
5. Refer to UNIT 5.4: Effective Waste Management/Recycling Practices
Topic 5.4.5 Organization's Procedures for Minimizing Waste



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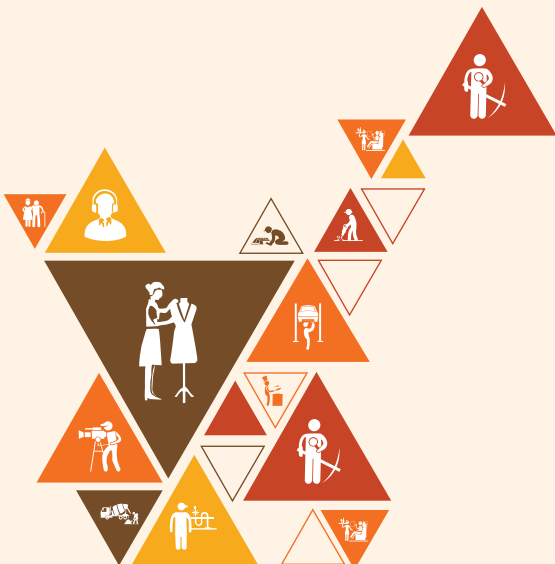
Transforming the skill landscape



6. Process of Interacting Effectively with Team Members and Customers

Unit 6.1 - Communication Skills

Unit 6.2 - Gender and PwD Sensitization at Workplace



TEL/N9102

Key Learning Outcomes



By the end of this module, the participants will be able to:

1. Explain the importance of interacting effectively with superiors, colleagues and customers.
2. Explain the need to respect differences of gender and ability.

Unit 6.1: Interaction with Supervisor, Peers and Customers

Unit Objectives

By the end of this unit, the participants will be able to:

1. Explain the importance of effective and different means of communication and establishing good working relationships with colleagues and superiors.
2. Describe different means and methods of communication.
3. Demonstrate ways to communicate professionally using different techniques such as face-to-face, telephonic and written means.
4. Explain the process of escalating issues at work.

Resources to be Used

Presentation slides, handouts on organization policies, flipchart, markers, case studies on effective communication, workplace scenarios for role-play, whiteboard, laptop and projector, printed communication examples

Say

- Hello everyone! Welcome to today's session on Interacting Effectively with Superiors, Col-leagues, and Customers.
- Our goal today is to understand the importance of effective interaction in the workplace and how it contributes to a positive work environment and career growth.
- Learning to interact effectively with colleagues, superiors, and customers is crucial for your professional development. It can lead to better working relationships, career advancement, and overall job satisfaction.

Do

- Start with a brief overview of the organization's policies on dress code, workplace timings, and workplace behavior.
- Introduce the organization's hierarchy and escalation matrix, highlighting the importance of knowing the reporting structure.
- Discuss the significance of building good working relationships and helping colleagues with problems.
- Explore different means and methods of communication, emphasizing when to use face-to-face, telephonic, or written communication effectively.

Ask

- What is one example of a workplace interaction that left a positive impression on you?
- Can you think of a time when miscommunication led to a misunderstanding at work?
- How do you usually handle disagreements with colleagues or superiors?

Elaborate

- Explain the importance of organization's policies on dress code, workplace timings, work-place behaviour, performance management, incentives, delivery standards, information security, etc.
- Define the organization's hierarchy and escalation matrix
- Discuss the importance of establishing good working relationships with colleagues and superiors
- Explain the importance of helping colleagues with problems
- Highlight the different means and methods of communication
- State the importance of providing appropriate information to colleagues and its importance
- Explain the organization's policies and procedures for working with colleagues and superiors
- Highlight the ways to communicate professionally using different techniques such as face-to-face, telephonic, and written means

Demonstrate

Demonstrate a role-play scenario where two colleagues resolve a workplace issue through effective communication.

Activity

1. **Activity name:** Communication Skills Workshop
2. **Objective:** To practice effective communication techniques.
3. **Type of Activity:** Group
4. **Resources:** Case studies, flipchart, markers, laptop
5. **Time Duration:** 30 minutes
6. **Instructions:**
 - Divide participants into groups.
 - Provide each group with a workplace scenario.
 - Ask them to discuss how they would handle the situation using effective communication.
 - Each group presents their solutions on the flipchart.
 - Facilitate a discussion on the presented solutions.
7. **Outcome:** Participants enhance their communication skills by applying effective communication techniques to real workplace scenarios and sharing their solutions with the group.

Notes for Facilitation

- Encourage active participation.
- Foster a respectful and open learning environment.
- Emphasize the importance of confidentiality when discussing workplace issues.
- Encourage participants to ask questions and seek clarification on organization policies.
- Highlight the value of feedback in improving communication skills.

Unit 6.2: Gender and PwD Sensitization at Workplace

Unit Objectives

By the end of this unit, the participants will be able to:

1. Explain the importance of understanding the consequences of gender-based behaviour.
2. State the organization standards and guidelines to be followed for PwD
3. Demonstrate appropriate verbal and non-verbal communication while interacting with People with Disability (PwD)
4. Explain the health and safety requirements at a workplace for PwD
5. Describe the process of recruiting people for a particular job profile w.r.t PwD and gender.
6. Explain various government / private schemes and benefits available for PwD and provide information about various institutes working for PwD to enable providing livelihood opportunities for PwD.

Resources to be Used

Participant Handbook, Whiteboard, Marker, Notepad, Pens, PowerPoint slides, Handouts, Flipchart paper, Laptop and Projector

Do

- Start with an icebreaker activity to create a comfortable learning environment.
- Use a combination of interactive techniques such as role-playing, small group discussions, and case studies.
- Encourage participation and discussion among participants.

Say

- This session aims to sensitise participants towards gender and PwD at the workplace and create an inclusive work environment.
- We will start with understanding the importance of gender and PwD sensitisation, followed by organisational standards and guidelines, appropriate communication with PwD, health and safety requirements, recruiting processes, and schemes and benefits available for PwD.
- This session will help us to understand how to create a more inclusive and supportive workplace culture.

Ask

- What are your thoughts on gender and PwD at the workplace?
- Can you share any experiences of working with PwD? How was the experience different from working with non-PwD colleagues?
- What do you think are the benefits of creating an inclusive work environment?

Elaborate

- Explain the consequences of gender-biased behaviour.
- Impact of gender-biased behaviour on the work environment and the legal implications. Importance of creating a supportive work environment.
- Standards and guidelines to be followed for PwD. Organisation's standards and guidelines related to PwD at the workplace.
- Appropriate verbal and non-verbal communication while interacting with PwD. Effective communication techniques and the importance of appropriate communication while interacting with PwD.
- Health and safety requirements for PwD at the workplace and the measures that should be taken to ensure a safe working environment for PwD.
- Process of recruiting people for a particular job profile w.r.t PwD and gender.
- Various government/private schemes and benefits available for PwD and the role of institutes working for PwD in providing livelihood opportunities for PwD.

Activity

1. **Activity name:** Case Study Analysis
2. **Type:** Group Activity
3. **Objective of the activity:** To create an action plan to make the workplace more inclusive.
4. **Resources:** Flipchart paper, markers, and case studies on PwD
5. **Time Duration:** 30 minutes
6. **Instructions:**
 - Divide participants into small groups and provide them with case studies on PwD.
 - Ask them to identify the challenges faced by PwD in the workplace and create an action plan to make the workplace more inclusive.
7. **Outcome:** Participants will gain a better understanding of the challenges faced by PwD and how to create a more inclusive workplace culture.

Notes for Facilitation

- Be sensitive and respectful while discussing gender and PwD related topics.
- Encourage participants to share their experiences and thoughts.
- Address any misconceptions or stereotypes related to PwD.
- Create a safe and inclusive learning environment.
- Ensure that the session is interactive and engaging.

Answers to Exercises for PHB

Multiple Choice Questions:

1. a. To improve teamwork and collaboration
2. b. To improve productivity and performance
3. d. All of the above
4. a. To improve productivity and performance
5. d. To plan and manage work effectively

Descriptive Questions:

1. Refer to UNIT 6.1: Communication skills
Topic 6.1.1 What is Communication?
2. Refer to UNIT 6.1: Communication skills
Topic 6.1.2 Effective Communication
3. Refer to UNIT 6.1: Communication skills
Topic 6.1.5 Modes of Communication at the Workplace
4. Refer to UNIT 6.2: Gender and PwD Sensitization at Workplace
Topic 6.2.1 Gender Equality at the Workplace
5. Refer to UNIT 6.2: Gender and PwD Sensitization at Workplace
Topic 6.2.3 Laws and Regulations to promote Gender Equality



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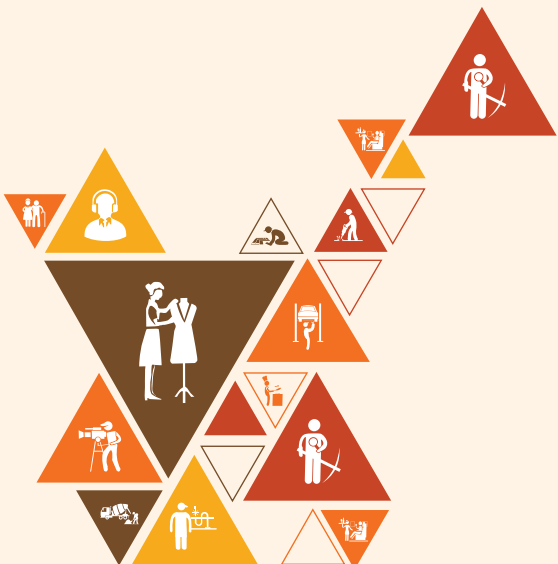


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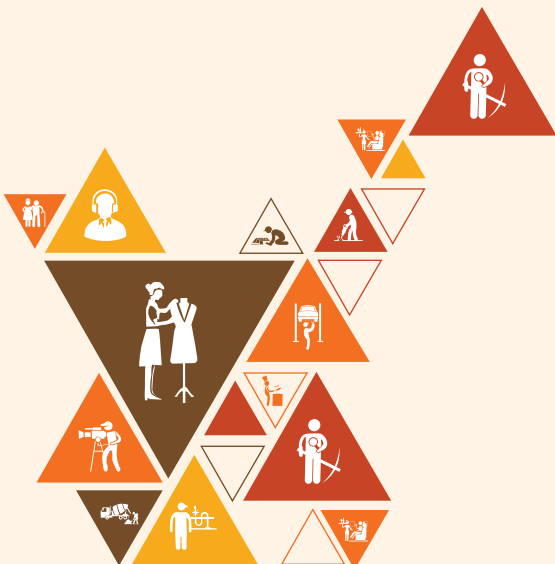


8. Annexures

Annexure I: Training Delivery Plan

Annexure II: Assessment Criteria

Annexure III: List of QR Codes Used in PHB



Annexure I

Training Delivery Plan

Training Delivery Plan			
Program Name:	Technician 5G – Active Network Installation		
Qualification Pack Name & Ref. ID	Technician 5G – Active Network Installation, TEL/Q6213 V2.0		
Version No.	2.0	Version Update Date	31/03/2022
Pre-requisites to Training (if any)	Not Applicable		
Training Outcomes	<p>By the end of this program, the participants will be able to:</p> <ol style="list-style-type: none"> 1. Demonstrate the process of installing the relevant 5G network infrastructure. 2. Demonstrate the process of maintaining the 5G network infrastructure. 3. Describe the process of following the occupational health and safety instructions during tower climbing. 4. Explain the importance of implementing effective communication and coordination at work. 5. Explain the importance of managing work and resources, and ensuring health and safety at work. 		

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
1	Introduction to the role of a 5G Technician – Active Network Installation	Introduction to the Telecom In-dustry	<ul style="list-style-type: none"> Describe the size and scope of the Telecom industry and its sub-sectors. 	Bridge module	Classroom lecture / Power-Point Presentation / Group Discussion / Quiz	Training Kit - Trainer Guide, Presentations, White-board, Marker, Projector, Laptop, Video Films	7 Theory (5:00) Practical (2:00)
		Role and Re-sponsibilities of a 5G Technician	<ul style="list-style-type: none"> Discuss the role and responsibilities of a 5G Technician – Active Network Installation. Identify various employment opportunities for a 5G Technician – Active Network Installation. 				7 Theory (5:00) Practical (2:00)
		Organizational Policies and Workflow	<ul style="list-style-type: none"> Discuss the organizational policies on workplace ethics, managing sites, quality standards, person-nel management, and public relations (PR). 				8 Theory (5:00) Practical (3:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			<ul style="list-style-type: none"> Describe the process workflow in the organization and the role of a 5G Technician – Active Network Installation in the process. 				
		Daily Operations and Technical Skills	<ul style="list-style-type: none"> List the various daily, weekly, monthly operations/activities that take place at the site under a 5G Technician – Active Network Installation. Demonstrate Software testing and configuration, as well as hardware and peripheral device maintenance and repair. Evaluate network performance and find ways of improvement. 				8 Theory (5:00) Practical (3:00)
2	Carry out Rack Level Installation	Assessing Rack Space and Equipment Compatibility	<ul style="list-style-type: none"> Check room space availability for rack installation. Check availability of appropriate racks for 5G equipment. Identify different types of racks for IT equipment. Explain standard rack dimensions. 	TEL/N6104 PC1, PC3, KU1, KU2	Classroom lecture / Power-Point Presentation / Group Discussion / Quiz	Training Kit (Trainer Guide, Presentations). White-board, Marker, Projector, Laptop, Fiber Cable Port, POE Switch, Optical Fiber Cable, Transceiver, Patch Panel	8 Theory (4:00) Practical (4:00)
		Equipment and Room Evaluation	<ul style="list-style-type: none"> Ensure proper electrical support for 5G equipment. Verify the absence of heat sources near the installation area. 	TEL/N6104 PC4, PC5			8 Theory (4:00) Practical (4:00)
			<ul style="list-style-type: none"> Check facility doors and floor suitability for equipment movement. Define criteria for selecting an installation room. 	TEL/N6104 PC2, KU5			8 Theory (4:00) Practical (4:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		Ventilation and Heat Management	<ul style="list-style-type: none"> Ensure adequate ventilation for heat dissipation. Explain the importance of ventilation for equipment. Recognize the significance of heat source prevention. 	TEL/N6104 PC6, KU9, KU10			8 Theory (4:00) Practical (4:00)
		Planning and Coordination	<ul style="list-style-type: none"> Develop a plan for rack placement in relation to resources. Coordinate with personnel or manufacturers for repairs. Learn the process of planning rack placement. Define criteria for selecting appropriate racks. 	TEL/N6104 PC7, PC11, KU7, KU11			8 Theory (4:00) Practical (4:00)
		Energy Efficiency and Rack Layout	<ul style="list-style-type: none"> Arrange racks in hot-aisle/cold-aisle layout. Explain the process of optimizing rack layout for energy efficiency. 	TEL/N6104 PC12, KU12			8 Theory (4:00) Practical (4:00)
		Equipment Installation and Safety	<ul style="list-style-type: none"> Follow manufacturer instructions for equipment installation. Explain the process of setting up equipment safely. 	TEL/N6104 PC15, KU15			8 Theory (4:00) Practical (4:00)
		Troubleshooting and Fault Resolution	<ul style="list-style-type: none"> Identify and troubleshoot equipment faults as per manufacturer instructions. Recognize common 5G equipment faults and troubleshooting. 	TEL/N6104 PC16, KU18			8 Theory (4:00) Practical (4:00)
		Configuration and Networking Fundamentals	<ul style="list-style-type: none"> Learn the process of configuring the operating system with VMWare. Explain networking fundamentals like TCP/IP, DNS, SSH, SSL, HTTP. 	TEL/N6104 KU19, KU20			7 Theory (3:00) Practical (4:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		Rack Component Knowledge	<ul style="list-style-type: none"> Identify different components of racks. Explain the standard dimensions of IT equipment. 	TEL/N6104 KU3, KU4			7 Theory (3:00) Practical (4:00)
		Load Management in Racks	<ul style="list-style-type: none"> Learn the process of planning equipment placement in racks. Ensure heavy equipment is placed at the bottom of racks. Recognize the importance of proper load distribution in racks. 	TEL/N6104 PC13, KU13, KU16			8 Theory (3:00) Practical (5:00)
		Vendor Equipment Inspection	<ul style="list-style-type: none"> Check vendor-provided equipment for damage. Coordinate with manufacturers to resolve manufacturing faults. 	TEL/N6104 PC10, PC17			8 Theory (3:00) Practical (5:00)
		Rack Types and Equipment Compatibility	<ul style="list-style-type: none"> Explain different types of racks for 5G equipment. Recognize the importance of electrical support for 5G equipment. 	TEL/N6104 KU6, KU8			8 Theory (3:00) Practical (5:00)
		Maximizing Space Utilization	<ul style="list-style-type: none"> Plan equipment installation for space optimization. Carry out installation of high-density equipment to prevent hot spots. 	TEL/N6104 PC9, KU14			8 Theory (3:00) Practical (5:00)
3	Carry out 5G active network installation	Installation Materials and Power Requirements	<ul style="list-style-type: none"> Ensure availability of required installation materials. Discuss about different types of power, earthing, and RF cables. 	TEL/N6105 PC1, KU4	Classroom lecture / Power-Point Presentation / Group Discussion / Quiz	Training Kit (Trainer Guide, Presentations). White-board, Marker, Projector, Laptop, Earthing Cable, Signal Analysis Software,	8 Theory (4:00) Practical (4:00)
			<ul style="list-style-type: none"> Determine the power requirements of gNodeB and equipment. Explain the process of determining power requirements. 	TEL/N6105 PC2, KU3			8 Theory (4:00) Practical (4:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		Cable Availability and Inspection	<ul style="list-style-type: none"> Check availability of appropriate power, earthing, and RF cables. Inspect and coordinate cable replacement if faulty. Recognize the importance of cable types and quality. 	TEL/N6105 PC3, PC4, KU4		5G Multiband Transceiver, Centralised Unit–Distributed Unit (CU-DU), RF Cable, Fibre Optic Cable, RF Connectors, 5G Radio Unit	8 Theory (4:00) Practical (4:00)
		Power and Earthing Cable Installation	<ul style="list-style-type: none"> Install power cables for equipment. Install earthing cables within specified limits. Learn the process of installing power and earthing cables. 	TEL/N6105 PC5, PC6, KU5			8 Theory (4:00) Practical (4:00)
		RF Cable Installation and Maintenance	<ul style="list-style-type: none"> Install RF cables between equipment and antennas. Ensure appropriate routing for easy maintenance. Check transmission and troubleshoot common faults. Explain the process of RF cable installation and maintenance. Learn troubleshooting procedures for RF cables. 	TEL/N6105 PC7,P-C8,PC98, KU5, KU7			8 Theory (4:00) Practical (4:00)
		Backhaul Connectivity	<ul style="list-style-type: none"> Coordinate and establish high throughput Ethernet/fiber-based backhaul connectivity. Use fiber optic for backhaul connectivity. Terminate backhaul connectivity for gNodeB configuration. Explain the process of establishing backhaul connectivity. Learn about the importance of backhaul termination. 	TEL/N6105 PC10, PC11, PC12, KU8, KU9			8 Theory (4:00) Practical (4:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		Centralized Unit-Distributed Unit Architecture	<ul style="list-style-type: none"> Create Centralized Unit-Distributed Unit (CU-DU) split architecture. Learn the process of creating CU-DU architecture. 	TEL/N6105 PC13, KU10			8 Theory (4:00) Practical (4:00)
		Configuring gNodeB	<ul style="list-style-type: none"> Configure gNodeB to the Centralized Unit (CU). Follow recommended measures to make gNodeB visible in the central unit. Explain the process of configuring gNodeB. 	TEL/N6105 PC14, PC15, KU11			8 Theory (4:00) Practical (4:00)
		Environmental Alarm Systems	<ul style="list-style-type: none"> Install environmental alarm systems and configure them to the central unit. Learn the process of installing and configuring environmental alarm systems. 	TEL/N6105 PC16, KU13			8 Theory (4:00) Practical (4:00)
		Operating System and VMWare	<ul style="list-style-type: none"> Install the appropriate Operating System (OS) and Virtual Machine (VM) ware. Learn the process of installing Operating System and VMWare. 	TEL/N6105 PC17, KU14			8 Theory (4:00) Practical (4:00)
		Explaining 3GPP and Releases	<ul style="list-style-type: none"> Elaborate 3rd Generation Partnership Project (3GPP) and their releases relevant to the 5G network. 	TEL/N6105 KU1			8 Theory (4:00) Practical (4:00)
		gNodeB Modules and Functions	<ul style="list-style-type: none"> Discuss about the constituent modules of 5G gNodeB and their functions. 	TEL/N6105 KU2			8 Theory (4:00) Practical (4:00)
		Cable Routing and Maintenance	<ul style="list-style-type: none"> Recognize the importance of appropriate cable routing for easy maintenance. 	TEL/N6105 KU6			8 Theory (4:00) Practical (4:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		Centralized Unit Visibility	<ul style="list-style-type: none"> Explain the importance of making gNodeB visible in the central unit for commissioning commands. 	TEL/N6105 KU12			8 Theory (4:00) Practical (4:00)
		Monitoring Network Operations	<ul style="list-style-type: none"> Demonstrate the process of monitoring the site in the network operation center. 	TEL/N6105 KU13			8 Theory (4:00) Practical (4:00)
4	Follow the Occupational Health and Safety Instructions during Tower Climbing	Tower Inspection and Hazard Identification	<ul style="list-style-type: none"> Perform visual observation of the tower for loose or missing hardware. Identify climbing obstructions and hazards. Explain the importance of adequate training in tower climbing. Learn the process of administering first aid for different medical emergencies. Recognize the importance of identifying and reporting unsafe conditions. 	TEL/N6246 PC1, PC2, KIU1, KU6, KU7	Classroom lecture / PowerPoint Presentation / Group Discussion / Quiz	Training Kit (Trainer Guide, Presentations), Whiteboard, Marker, Projector, Laptop, PPE Kit, Safety Kit, Carabiners Connectors, Harnesses, RF Safety, Two Way Radios, Tower Climbing Kits, Helmet, RF Monitor	8 Theory (4:00) Practical (4:00)
		Safety Equipment and PPE	<ul style="list-style-type: none"> Check availability of safety equipment and tools. Inspect and use appropriate Personal Protective Equipment (PPE). Explain the importance of well-maintained safety equipment. Identify the appropriate PPE required for tower climbing. 	TEL/N6246 PC7, PC8, KU2, KU3			8 Theory (4:00) Practical (4:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		First Aid and In-cident Reporting	<ul style="list-style-type: none"> Ensure a fully-equipped first aid kit is available. Assist in preparing incident reports. Recognize the importance of first aid kits. Learn the importance and process of preparing incident reports. 	TEL/N6246 PC9, PC28, KU4, KU18			8 Theory (4:00) Practical (4:00)
		Safety Planning and Weather Awareness	<ul style="list-style-type: none"> Coordinate comprehensive safety planning. Check weather conditions before working at heights. Explain the importance of safety planning. Recognize the significance of checking weather conditions. 	TEL/N6246 PC12, PC14, KU10, KU11			8 Theory (4:00) Practical (4:00)
		Electrical Haz-ards and Warn-ing Signs	<ul style="list-style-type: none"> Check for electrical hazards. Work safely near electricity wires. Place appropriate warning signs near live electricity wires. Learn about applicable electrical health and safety standards. 	TEL/N6246 PC11, PC24, PC25, KU15			8 Theory (4:00) Practical (4:00)
		Equip-ment and Machinery In-spection	<ul style="list-style-type: none"> Ensure safe distance from potential danger near tower sites. Identify unsafe conditions and report promptly. Recognize the process of conducting inspections of equipment and machinery. Explain applicable health and safety standards and regulations. 	TEL/N6246 PC16, PC13, KU14, KU17			8 Theory (4:00) Practical (4:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		Climbing Techniques and Practices	<ul style="list-style-type: none"> Use a full-body harness and maintain complete tie-off. Use safety cable climb or multiple lanyards when moving on towers. Use appropriate PPE while climbing and working on towers. Follow recommended tower climbing practices. Learn the appropriate climbing and working practices for telecom structures. 	TEL/N6246 PC18, PC19, PC20, PC21, KU16			8 Theory (4:00) Practical (4:00)
		Communication and Health	<ul style="list-style-type: none"> Use a two-way radio for communication. Report impaired physical health affecting work at heights. Explain the benefit of using two-way radios for communication. Learn the importance of not working at heights in case of impaired physical health. 	TEL/N6246 PC22, PC23, KU5, KU12			8 Theory (4:00) Practical (4:00)
		RF Safety and Compliance	<ul style="list-style-type: none"> Check the strength of radio waves with an RF detector. Discuss about RF safety and regulatory compliance. 	TEL/N6246 PC10, KU9			8 Theory (4:00) Practical (4:00)
		Continuous Learning and Safety Awareness	<ul style="list-style-type: none"> Recognize the importance of regular safety training and checking PPE. Explain the importance of continually enhancing safety skills and awareness. 	TEL/N6246 KU8, KU13			8 Theory (4:00) Practical (4:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
5	Organise Work and Resources as per Health and Safety Standards	Workplace Organization and Safety	<ul style="list-style-type: none"> Maintain a clean and tidy workspace. Check for water spills and report them. Maintain appropriate posture during work. Sanitize workstation and equipment regularly. Practice hand hygiene with soap or sanitizer regularly. Summarize the rules and regulations for maintaining health and safety at the workplace. Learn different methods of cleaning, disinfection, sterilization, and sanitization. Recognize the significance of personal hygiene practices, including hand hygiene. Explain the organization's procedures for minimizing waste. Learn about waste management and methods of waste disposal. 	TEL/N9101 PC1, PC8, PC15, PC17, PC18, KU8, KU13, KU14, KU20, KU21	Classroom lecture / PowerPoint Presentation / Group Discussion / Quiz	Training Kit (Trainer Guide, Presentations). White-board, Marker, Projector, Laptop, Relevant Station-ery, First Aid Kit and Equipment used in Medical Emergencies	8 Theory (3:00) Practical (5:00)
		Accountability and Efficiency	<ul style="list-style-type: none"> Perform individual roles and responsibilities and take accountability for work. Record/document tasks completed within specific timelines. Implement schedules for timely task completion. Analyze problems and communicate solutions. Use electrical equipment and appliances properly. 	TEL/N9101 PC2, PC3, PC4, PC6, PC29, KU1, KU2, KU3, KU4, KU5, KU7, KU18			8 Theory (3:00) Practical (5:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			<ul style="list-style-type: none"> Learn strategies for pursuing skill advancement. Understand key performance indicators for new tasks. Comprehend timelines, goals, and their relevance. Recognize the importance of quality and timely delivery. Learn about time and cost management. Identify common electrical problems and practices for conserving electricity. 				
		Health, Safety, and Emergency Procedures	<ul style="list-style-type: none"> Comply with organization's health, safety, and security policies. Report breaches in health, safety, and security policies. Identify and respond to hazards and emergencies. Follow recommended personal hygiene and sanitation practices. Carry out routine cleaning of tools, machines, and equipment. Identify hazards and risks in the workplace. Recognize relevant signage, warnings, and labels. Learn procedures to report breaches in health, safety, and security. Comprehend emergency procedures and their importance. Understand the path of disease transmission. Learn the correct method of donning and doffing PPE. 	TEL/N9101 PC7, PC9, PC12, PC22, PC25, KU9, KU10, KU11, KU12, KU15, KU16			7 Theory (2:00) Practical (5:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		Resource Management and Environmental Awareness	<ul style="list-style-type: none"> • Demonstrate handling of materials with care and maintain appropriate posture. • Optimize usage of material including water in tasks. • Optimize use of electricity/energy. • Identify recyclable, non-recyclable, and hazardous waste. • Deposit recyclable and reusable material appropriately. • Dispose non-recyclable and hazardous waste as recommended. • Learn ways to manage resources and materials efficiently. • Illuminate on the waste categorization and use of different colors of dustbins. • Recognize common sources of pollution and ways to minimize them. 	TEL/N9101 PC16, PC23, PC26, PC30, PC31, PC32, KU17, KU19, KU22			7 Theory (2:00) Practical (5:00)
6	Interact Effectively with Team Members and Customers	Effective Communication and Teamwork	<ul style="list-style-type: none"> • Receive and interpret work requirements accurately. • Communicate professionally using appropriate modes. • Respond to queries and seek/provide clarifications. • Coordinate with the team to integrate work as per requirements. • Explain the importance of establishing good working relationships. • Learn different means and methods of communication. • Understand the importance of gender-based concepts, issues, and legislation. 	TEL/N9102 PC1, PC6, PC7, PC8, KU3, KU5, KU9, KU10			8 Theory (3:00) Practical (5:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			<ul style="list-style-type: none"> Learn about organization standards and guidelines for People with Disability (PwD). 				
		Conflict Resolution and Emotional Intelligence	<ul style="list-style-type: none"> Resolve conflicts within the team/with customers. Recognize emotions accurately in self and others. Prioritize team and organization goals above personal goals. Recognize the importance of understanding consequences of gender-biased behavior. 	TEL/N9102 PC9, PC10, PC11, KU8			8 Theory (3:00) Practical (5:00)
		Diversity and Inclusion	<ul style="list-style-type: none"> Maintain a conducive environment for all genders. Encourage appropriate behavior and conduct with people across gender. Assist team members with disabilities in overcoming challenges. Practice appropriate verbal and non-verbal communication while interacting with PwD. Ensure equal participation of people across genders in discussions. Explain the importance of understanding consequences of gender-biased behavior. Discuss the laws, acts, and provisions for PwD by statutory bodies. Explain health and safety requirements at the workplace for PwD. 	TEL/N9102 PC12, PC13, PC14, PC15, PC16, KU8, KU10, KU11			7 Theory (2:00) Practical (5:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		Organization Policies and Procedures	<ul style="list-style-type: none"> • Inform about unforeseen disruptions or delays. • Participate in decision-making and provide facts and figures. • Rectify errors and ensure they are not repeated. • Comply with organization's policies and procedures for working with team members. • State the organization's policies on various aspects. • Explain the organization's hierarchy and escalation matrix. • Elaborate on the organization's policies and procedures for working with colleagues and superiors. • Explain the process of recruiting people for a particular job profile with respect to PwD and gender. • List various government/private schemes and benefits available for PwD and information about various institutes working for PwD. 	TEL/N9102 PC2, PC3, PC4, PC5, KU1, KU2, KU7, KU12, KU13			7 Theory (2:00) Practical (5:00)
Total Duration							Theory Duration 180:00 Practical Duration 210:00
Employability Skills (DGT/VSQ/N0102) (https://www.skillindiadigital.gov.in/content/list)							60:00

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
OJT							120:00
Total Duration							Theory + Practical + ES + OJT = 570:00

Annexure II

Assessment Criteria

CRITERIA FOR ASSESSMENT OF TRAINEES

Assessment Criteria for Technician 5G – Active Network Installation	
Job Role	Technician 5G – Active Network Installation
Qualification Pack	TEL/Q6213, V2.0
Sector Skill Council	Telecom Sector Skill Council

S. No.	Guidelines for Assessment
1	The assessment for the theory part will be based on knowledge bank of questions approved by the SSC.
2	Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/ Set of NOS.
3	Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below).
4	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on this criterion.
5	To pass the Qualifications File, every trainee should score a minimum of 70% of aggregate marks.
6	In case of unsuccessful completion, the trainee may seek reassessment on the Qualification File.

Assessment Outcomes	Assessment Criteria for Outcomes	Marks Allocation		
		Theory	Practical	Viva
TEL/N6104: Carry out rack-level installation	PC1. check the availability of space in the room selected for rack and equipment installation to ensure it can support the installation of racks currently and additional racks in the future	2	3	1
	PC2. check the facility's doors have appropriate height, and the floor is adequately strong to support the movement and installation of racks and equipment	1	3	1
	PC3. check the availability of the appropriate type of racks for the installation of 5G network equipment, ensuring the racks allow easy cable and device management	2	2	1
	PC4. ensure the room's circuits can provide the correct voltages and sufficient amperage for all the 5G network equipment	1	2	1
	PC5. check that there are no sources of heat in and around the room selected for the installation of racks and equipment	1	2	1
	PC6. ensure there is adequate active or passive ventilation, such as ducts, dropped ceilings or Computer Room Air Conditioners (CRACs) for the dissipation of heat generated by the equipment	1	4	1
	PC7. prepare a plan for the placement of the racks in relation to the room and important resources, such as power circuits and cooling equipment	3	4	1
	PC8. arrange racks in a hot-aisle/cold-aisle layout to reduce energy use	1	2	1

	PC9. plan the installation of equipment on racks to maximise space utilisation inside the racks, and permit easy service and future equipment installations	3	3	1
	PC10. check gNodeB received from the vendor to ensure it is not damaged or faulty	1	3	1
	PC11. co-ordinate with the relevant personnel or manufacturer for the repair or replacement of damaged/ faulty gNodeB	1	2	1
	PC12. set up gNodeB and other 5G network equipment on racks safely and secure them using nuts and screws, adhering to the load rating of racks	3	4	2
	PC13. ensure to place the heavy equipment at the bottom of racks to prevent them from becoming top-heavy and prone to tipping over	1	2	1
	PC14. carry out the installation of blade servers and other high-density and high wattage loads in multiple racks to prevent problematic hot spots	3	3	1
	PC15. follow the manufacturer's instructions provided in the installation manual for safe and successful installation of equipment	1	2	1
	PC16. identify faults/malfunctions in the equipment and carry out troubleshooting as per the manufacturer's instructions	2	3	1
	PC17. co-ordinate with the manufacturer to resolve any manufacturing faults	1	2	1
	PC18. use pre-configured equipment provided by the manufacturer or follow the manufacturer's instructions to configure the operating system with the Virtual Machine (VM) ware	2	4	2
	NOS Total	30	50	20
TEL/N6105: Carry out 5G active network installation	PC1. ensure the availability of required installation materials as per the installation document, such as end connectors, thimbles etc.	1	3	1
	PC2. determine the power requirements of the gNodeB and other equipment	1	2	-
	PC3. check the availability of appropriate power, earthing, and Radio Frequency (RF) cables	1	3	1
	PC4. check the cables to ensure they are not faulty or damaged and co-ordinate with the relevant personnel to get them replaced	1	4	1
	PC5. install power cables between the equipment and power source to ensure power supply to the equipment	1	4	-
	PC6. install earthing cables to the earth source, ensuring the earth value is within the specified limits	1	4	1
	PC7. carry out the installation of RF cables between gNodeB/ other equipment and the antennas on the cell tower	1	2	1
	PC8. ensure routing and termination of cables between omnidirectional and directional or sector antennas in such a manner to allow their easy maintenance	1	3	1
	PC9. check for transmission between the equipment and the antennas and carry out appropriate troubleshooting, as required	2	4	1
	PC10. co-ordinate with the relevant personnel to establish high throughput ethernet/ fiber based backhaul connectivity on the Ethernet interface	2	2	-
	PC11. use fibre optic for backhaul connectivity for the 5G network	2	2	-
	PC12. terminate the backhaul connectivity to ensure gNodeB is configurable and connected to the central office	2	4	1

	PC13. create Centralised Unit–Distributed Unit (CU-DU) split architecture	3	5	1
	PC14. configure gNodeB to the Centralised Unit (CU)	3	5	1
	PC15. follow the recommended measures to make the gNodeB visible in the central unit so that commissioning commands can be given from the central unit	1	3	-
	PC16. install the appropriate environmental alarm systems and configure them to the central unit so that the site can be monitored in the network operation centre	4	5	-
	PC17. install the appropriate Operating System (OS) and the Virtual Machine (VM) ware	3	6	-
	NOS Total	30	60	10
TEL/N6246: Follow the occupational health and safety instructions during tower climbing	PC1. perform a visual observation of the tower using binoculars to check for loose or missing hardware and ensure such issues are fixed before climbing the tower	1	2	1
	PC2. identify any climbing obstructions and hazards, such as bird roosts and insect nests and take appropriate measures to deal with them	1	2	-
	PC3. inspect turnbuckles for correct installation and check the tension of the guy wires on guyed towers to ensure they are within their recommended tension range	1	2	1
	PC4. check guy preforms on guyed towers and thimbles for signs of damage	1	2	-
	PC5. check the verticality of the tower to identify the eccentricity/leaning of the tower due to weakness in the tower members by wind load or excessive line loading	2	2	1
	PC6. ensure all the identified issues with the tower are addressed through coordination with the relevant authority, before undertaking tower climbing	1	2	-
	PC7. check the availability of appropriate tower ladders, hoisting and rigging equipment, and relevant tools and machinery for climbing towers, ensuring they are appropriately maintained and safe for use	1	2	1
	PC8. check the availability of appropriate Personal Protective Equipment (PPE) and inspect it to ensure it is well-maintained and safe for use, ensuring not to undertake any rigging work without PPE	1	2	-
	PC9. check the availability of a fully equipped first aid kit at the work site to deal with minor medical emergencies	1	2	1
	PC10. check the strength of radio waves at the tower work site using a Radio Frequency (RF) detector to ensure adherence to applicable RF safety regulations	2	2	-
	PC11. check there are no serious electrical hazards at the tower work site, such as overhead electricity wires	1	2	1
	PC12. co-ordinate with the relevant personnel to conduct comprehensive safety planning, including a Job Hazard Analysis (JHA) and an Emergency Action Plan (EAP)	1	2	-
	PC13. identify unsafe conditions at the work site and report them promptly to the appropriate authority	1	1	1
	PC14. check the weather conditions through reliable sources to ensure no storm, lightning or other adverse weather conditions are expected that could impact working at heights on towers	1	2	1
	PC15. measure the wind velocity using an anemometer to ensure tower climbing is carried out when the wind velocity is under the recommended limits	1	2	1

	PC16. ensure any equipment, machinery, vehicles, or materials which are potential danger near tower sites and live wires are maintained at a safe distance	1	2	1
	PC17. follow the applicable health and safety protocol at the work site, including registering	1	2	1
	PC18. use a full-body harness tied off at appropriate spots on the tower to maintain complete tie-off while on the tower	1	2	-
	PC19. use a safety cable climb or two or more lanyards when moving on towers	1	2	-
	PC20. use the appropriate PPE while climbing up and down and working on towers, following the manufacturer's instructions to ensure its effectiveness	1	2	-
	PC21. follow the recommended tower climbing practices while climbing and working on telecom towers to minimise any injuries and untoward incidents during tower climbing	1	2	1
	PC22. use two-way radio while working on towers to maintain continuous communication with the ground crew	1	2	-
	PC23. co-ordinate with the relevant authority to report impaired physical health and stop working at heights under the influence of drowsiness-inducing medication	1	2	1
	PC24. carry out work away from electricity wires or co-ordinate with the relevant authority to have electricity turned off while working near electricity wires, as appropriate	1	2	1
	PC25. ensure to place appropriate warning signs to warn co-workers while working near live electricity wires	1	2	1
	PC26. ensure compliance with the applicable health and safety standards and regulations	1	2	-
	PC27. administer first aid for different types of medical emergencies	1	2	-
	PC28. assist the relevant personnel in preparing incident reports by providing information regarding tower climbing incidents	1	1	-
	NOS Total	30	55	15
TEL/N9101: Organize Work and Resources as per Health and Safety Standards	PC1. keep workspace clean and tidy	-	1	-
	PC2. perform individual role and responsibilities as per the job role while taking accountability for the work	1	1	1
	PC3. record/document tasks completed as per the requirements within specific timelines	-	1	1
	PC4. implement schedules to ensure timely completion of tasks	-	2	-
	PC5. identify the cause of a problem related to own work and validate it	2	2	-
	PC6. analyses problems accurately and communicate different possible solutions to the problem	1	2	-
	PC6. comply with organization's current health, safety, security policies and procedures	1	1	-
	PC8. check for water spills in and around the workspace and escalate these to the appropriate authority	1	2	1
	PC9. report any identified breaches in health, safety, and security policies and procedures to the designated person	1	2	1
	PC10. use safety materials such as goggles, gloves, ear plugs, caps, ESD pins, covers, shoes, etc.	1	2	1






	PC11. avoid damage of components due to negligence in ESD procedures or any other loss due to safety negligence	2	3	1
	PC12. identify hazards such as illness, accidents, fires or any other natural calamity safely, as per organisation's emergency procedures, within the limits of individual's authority	2	1	-
	PC13. participate regularly in fire drills or other safety related workshops organised by the company	1	3	-
	PC14. report any hazard outside the individual's authority to the relevant person in line with organisational procedures and warn others who may be affected	1	3	-
	PC15. maintain appropriate posture while sitting/standing for long hours	1	1	-
	PC16. handle heavy and hazardous materials with care, while maintaining appropriate posture	1	1	-
	PC16. sanitize workstation and equipment regularly	1	2	-
	PC18. clean hands with soap, alcohol- based sanitizer regularly	-	1	-
	PC19. avoid contact with anyone suffering from communicable diseases and take necessary precautions	-	1	-
	PC20. take safety precautions while travelling e.g. maintain 1m distance from others, sanitize hands regularly wear masks, etc.	1	2	-
	PC21. report hygiene and sanitation issues to appropriate authority	1	1	-
	PC22. follow recommended personal hygiene and sanitation practices, for example, washing/sanitizing hands, covering face with a bent elbow while coughing/sneezing, using PPE, etc.	1	1	-
	PC23. optimize usage of material including water in various tasks/ activities/processes	1	2	-
	PC24. use resources such as water, electricity and others responsibly	1	2	1
	PC25. carry out routine cleaning of tools, machine and equipment	1	2	-
	PC26. optimize use of electricity/energy in various tasks/activities/ processes	1	3	1
	PC26. perform periodic checks of the functioning of the equipment/ machine and rectify wherever required	1	3	1
	PC28. report malfunctioning and lapses in maintenance of equipment	1	2	-
	PC29. use electrical equipment and appliances properly	1	2	-
	PC30. identify recyclable, non-recyclable and hazardous waste	1	2	1
	PC31. deposit recyclable and reusable material at identified location	1	3	-
	PC32. dispose non-recyclable and hazardous waste as per recommended processes	1	3	-
	NOS Total	30	60	10
TEL/N9102: Interact Effec- tively with Team Members and Customers	PC1. receive work requirements from superiors and customers and interpret them correctly	1	2	-
	PC2. inform the supervisor and/or concerned person about any unforeseen disruptions or delays	2	4	1
	PC3. participate in decision making by providing facts and figures, giving/ accepting constructive suggestions	2	5	1
	PC4. rectify errors as per feedback and ensure the errors are not repeated	2	4	-
	PC5. comply with organisation's policies and procedures for working with team members	1	2	-






	PC6. communicate professionally using appropriate mode of communication such as face-to-face, telephonic and written	2	4	1
	PC6. respond to queries and seek/provide clarifications if required	2	4	1
	PC8. co-ordinate with team to integrate work as per requirements	-	3	-
	PC9. resolve conflicts within the team/with customers to achieve smooth workflow	1	5	1
	PC10. recognize emotions accurately in self and others to build good relationships	1	4	-
	PC11. prioritize team and organization goals above personal goals	-	4	1
	PC12. maintain a conducive environment for all the genders at the workplace	2	5	1
	PC13. encourage appropriate behavior and conduct with people across gender	2	5	1
	PC14. assist team members with disability in overcoming any challenges faced in work	3	4	1
	PC15. practice appropriate verbal and non- verbal communication while interacting with People with Disability (PwD)	2	4	1
	PC16. ensure equal participation of the people across genders in discussions	2	6	-
	NOS Total	25	65	10
DGT/VSQ/N0102: Employability Skills (60 Hours)	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	-
	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	-
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	-




Annexure III

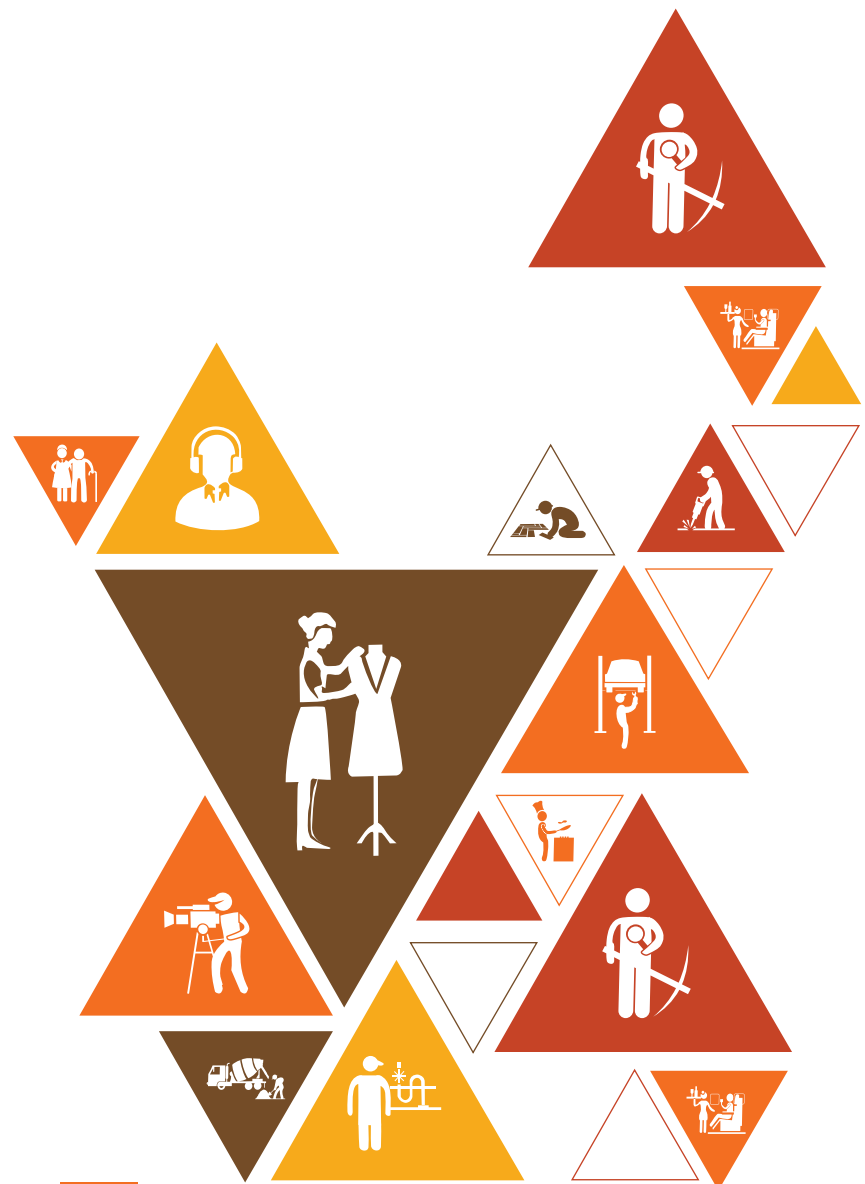
List of QR Codes Used in PHB

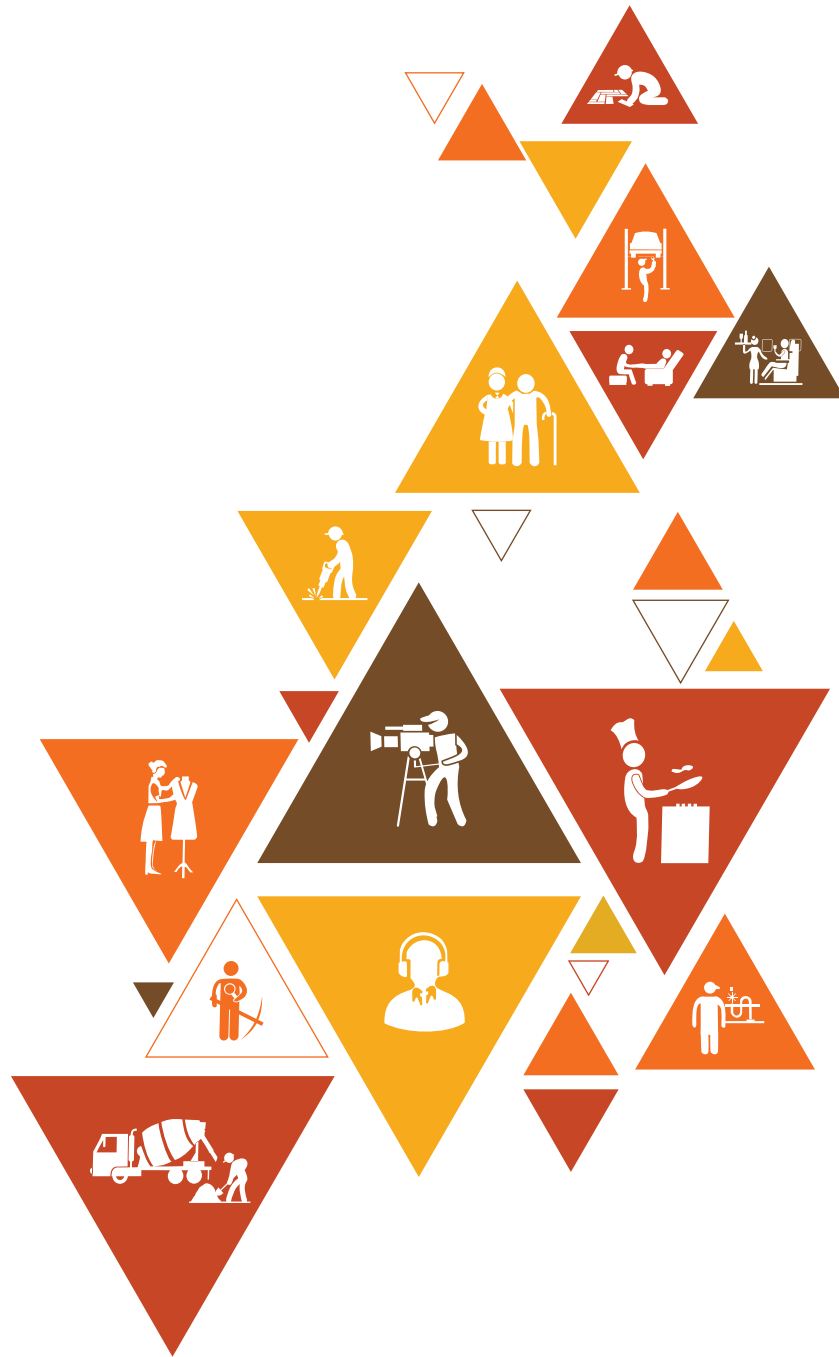
Module No.	Unit No.	Topic Name	Page No. in PHB	Link for QR Code (s)	QR code (s)
1. Introduction to the Role of a 5G Technician – Active Network Installation	UNIT 1.1: Job Role of a 5G Technician	1.1.1 Size of Telecom Industry and Its Sub Sectors	26	https://www.youtube.com/watch?v=T2SaEuF6i1M	 Evolution of Telecom Industry in India
		1.1.5 Responsibilities and challenges of a 5G Technician	26	https://www.youtube.com/watch?v=gQr08TnPFno	 What are the challenges of building out a 5G network?
2. Process of Carrying Out Rack-level Installation	UNIT 2.1: Preparing for the Installation of 5G Devices	2.1.1 Different Types of Racks Used for the Installation of Different Types of IT Equipment	57	https://www.youtube.com/watch?v=DpJmI0KrzVM	 Networking Equipment Racks
		2.1.3 Different Components of Racks	57	https://www.youtube.com/watch?v=_rQ7X1uPhsg	 How to pick an IT rack
	UNIT 2.2: Process of Carrying Out the Installation of 5G Devices	2.2.2 Important of 5G Resources, Such as Power Circuits and Cooling Equipment	57	https://www.youtube.com/watch?v=ASHRVx3tkDY	 Working Principle of Chiller Plant

Module No.	Unit No.	Topic Name	Page No. in PHB	Link for QR Code (s)	QR code (s)
		2.2.9 Process of Arranging Racks in a Hot-aisle/ Cold-aisle Lay-out to Reduce Energy Use	57	https://www.youtube.com/watch?v=gzXUpmyQoRo	 Cold Aisle Containment Installation
3. Process of Carrying out 5G Active Network Installation	UNIT 3.1: Process of Carrying Out a Power, Earthing and RF Cabling	3.1.1 Process of installing earthing cables to the earth source	85	https://www.youtube.com/watch?v=5R-zEi-15WKA&t=211s	 Earthing System
		3.1.2 Process of Installing Power Cables Between the Equipment and Power Source to Ensure Power Supply to the Equipment	85	https://www.youtube.com/watch?v=f0k2aUizj4s	 Cable Termination In Panel
	UNIT 3.2: Process of Installation and Commissioning Backhaul Connectivity	3.2.2 Use of Fiber Optic for Backhaul Connectivity for the 5G Network	85	https://www.youtube.com/watch?v=CMAMyH229D4	 C-RAN Architecture
		3.2.5 Steps involve in configuring gNodeB to the Centralised Unit (CU)	85	https://www.youtube.com/watch?v=sWSe9KOLyM0	 What is gNodeB?

Module No.	Unit No.	Topic Name	Page No. in PHB	Link for QR Code (s)	QR code (s)
4. Process of Following the Occupational Health and Safety Instructions during Tower Climbing	UNIT 4.1: Pre-climbing Tower Inspection	4.1.2 Availability of Well-maintained Safety Equipment Before Climbing Towers	114	https://www.youtube.com/watch?v=r3X71UgHP-jM&t=359s	 Cell Tower Technician Training
		4.1.3 PPE for Tower Climbing	114	https://www.youtube.com/watch?v=KA8-530Ge9g	 NATE Climber Connection
5. Process of Organizing Work and Resources as per Health and Safety Standards	UNIT 5.1: Explain the Importance of Performing Work as per Quality Standards	5.1.2 Key Performance Indicators for the New Tasks for Employees	148	https://www.youtube.com/watch?v=t2vZmnaukLY	 key Performance Indicators For Employees
		5.1.7 Various Ways of Time and Cost Management	148	https://www.youtube.com/watch?v=iDbdXTMnOmE	 How to manage your time more effectively
			148	https://www.youtube.com/watch?v=EyPFiOYO32M	 The Basics of Project Cost Management

Module No.	Unit No.	Topic Name	Page No. in PHB	Link for QR Code (s)	QR code (s)
6. Process of Inter-acting Effectively with Team Members and Customers	UNIT 6.1: Interaction with Supervisor, Peers and Customers	6.1.1 What is Communication?	166	https://www.youtube.com/watch?v=I6IAhXM-vps	 Effective Communication
	UNIT 6.2: Gender and PwD Sensitization at Workplace	6.2.1 Gender Equality at the Workplace	166	https://www.youtube.com/watch?v=IVvEhYRpYWA	 Gender equality in the workplace
		6.2.4 PwD Sensitization at Workplace	166	https://www.youtube.com/watch?v=ijJd0b5U7GI	 Recruiting people with disability
	Employability Skills				https://www.skillindiadigital.gov.in/content/list







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