Facilitator Guide

In-Building Solution Wireless (IBS) Technician

Skill India
कौशल भारत - कुशल भारत

GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

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> Skill development of the new generation is a national need and is the foundation of Aatmnirbhar Bharat

Shri Narendra Modi
Prime Minister of India

Acknowledgements

About this Guide

The facilitator guide (FG) for In-Building Wireless Solution (IBS) Technician is primarily designed to facilitate skill development and training of people, who want to become professional In-Building Wireless Solution (IBS) Technician 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/N6703: Maintain IBS Networks at the site
2. TEL/N6702: Install Wireless Network Solutions at Site
3. TEL/N6701: Prepare for deploying In-Building Wireless Solutions
4. TEL/N9101: Organize Work and Resources as per Health and Safety Standards
5. DGT/VSQ/N0102: Employability Skills (60 Hours)

Post this training, the participants will be able to perform tasks as professional In-Building Wireless Solution (IBS) Technician. 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

Employability Skills is available at the following location :

https://www.skillindiadigital.gov.in/content/list

Scan the QR code below to access the ebook

1. Introduction to the Latest Trends in Cellular and Wireless Networks, Role and Responsibilities of an In-Building Wireless Solution (IBS) Technician

Unit 1.1 - 5G Trends and the Role of In-Building Wireless Solutions in Telecom Evolution

Bridge Module

Key Learning Outcomes

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

1. Discuss the job role of an In-Building Wireless Solution (IBS) Technician.
2. Explain the scope of work for an In-Building Wireless Solution (IBS) Technician.

Unit 1.1: 5G Trends and the Role of In-Building Wireless Solutions in Telecom Evolution

Unit Objectives ⌖

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

1. Discuss the latest trends in the Telecom industry with the introduction of 5G
2. Discuss how the Indian market is going to perform in the next ten years with regard to telecom industry
3. Discuss how the Indian telecom industry affects the Indian economy
4. List the safety precautions to be taken while at work
5. Discuss the importance of using the safety equipment while at work
6. Explain the Role and Responsibilities of the Inbuilding Wireless Solution Technician
7. Explain the professional skills required to move up in the career ladder for an Inbuilding Wireless Solution Technician.
8. List the advantages of using 5G networks
9. State the growth opportunities the telecom sector brings in for the country

Resources to be Used ⚙

Whiteboard, marker pens, projector, laptop, 5G network simulation software (if available), telecom industry reports, Indian telecom market projections, safety equipment examples (gloves, helmets, etc.), slides, handouts on professional skills for technicians, job role descriptions for In-building Wireless Solution Technicians, safety guidelines handouts.

Say 💬

- Good morning, everyone! I hope you're ready to dive into some exciting developments in the telecom world.
- Today, we'll be exploring the latest trends in the telecom industry, particularly focusing on 5G, its role in telecom evolution, and how it's shaping the future of our sector.
- Understanding 5G and the importance of In-building Wireless Solutions is key because these trends are driving major advancements in technology, creating new opportunities for both the industry and professionals like you.

Ask 🗨

- Have you noticed the shift in mobile speeds or coverage in the last year?
- How often do you think about the technology that powers your mobile network while using it daily?
- Do you have any ideas on how 5G will impact daily life or work in the next 5-10 years?

Do ☑

- Start by introducing the concept of 5G, its significance, and how it differs from previous generations.
- Discuss the role of In-building Wireless Solutions and how they support the growth of 5G networks.
- Break down the current state of the telecom industry in India and the expected growth in the next decade.
- Highlight the impact of telecom advancements on the Indian economy.
- Discuss the responsibilities and skills required for an In-building Wireless Solution Technician.
- Review safety precautions in the telecom industry and emphasize the use of safety equipment while working.
- Conclude by talking about the advantages of 5G networks and the future growth potential within India's telecom sector.

Elaborate

- Focus on advancements in mobile data speeds, new services, and challenges like network deployment.
- Project growth in mobile data usage, 5G rollout, and industry expansion.
- Focus on job creation, infrastructure development, and sector contributions to GDP.
- Include general safety guidelines like protective gear and safe handling of telecom equipment.
- Stress the necessity of protective measures to prevent accidents.
- Outline key duties such as network installation, maintenance, and troubleshooting.
- Focus on technical proficiency, problem-solving, and communication skills.
- Discuss benefits like faster internet speeds, low latency, and increased network reliability.
- Mention new job roles, technological advancements, and global business prospects.

Demonstrate

Demonstrate the process of installing a basic In-building Wireless solution by showing key tools and steps involved. Emphasize safe handling of equipment and steps involved in troubleshooting common network issues.

Activity

1. **Activity Name:** Role-Playing 5G Deployment Scenario
2. **Objective:** To help participants understand the importance of In-building Wireless Solutions in the 5G rollout process and the technician's role.
3. **Type of Activity:** Group activity
4. **Resources:** Role-playing scripts, whiteboard, markers, safety equipment examples.
5. **Time Duration:** 30 minutes

6. **Instructions:**
   - Divide participants into small groups, assigning them roles as telecom engineers, technicians, and safety officers.
   - Provide each group with a scenario where they are responsible for installing and maintaining a 5G In-building Wireless solution in a corporate building.
   - Groups should discuss the technical challenges, safety measures, and deployment strategies involved in the project.
   - After 20 minutes of discussion, each group presents their solution to the class, explaining their process and safety protocols.
7. **Outcome:** Participants will gain hands-on understanding of 5G deployment and the role of technicians in ensuring network reliability and safety during installation.

Notes for Facilitation

- Encourage active participation by making the session interactive. Ask questions that invite participants to share personal experiences with mobile technology or safety practices.
- Be mindful of participants' levels of understanding. Provide additional context if any concept, such as 5G technology, is unclear.
- Remind participants of the importance of safety in telecom work—ensure they understand how safety practices directly affect their careers and health.
- As a facilitator, ensure everyone understands the relationship between the telecom industry's growth and its impact on the broader economy.
- Reinforce the significance of developing professional skills that align with the evolving demands of the telecom sector.

Answers to Exercises for PHB

Multiple Choice Questions:

1. c. Low latency and faster speeds
2. c. Significant growth due to 5G and increasing data demand
3. b. To install and maintain wireless network systems inside buildings
4. b. To avoid accidents and injuries
5. b. Enhanced connectivity and support for advanced technologies

Descriptive Questions:

1. Refer Unit 1.1.1 Trends in the Telecom industry with the introduction of 5G
2. Refer Unit 1.1.2 Future Trends in the Indian Telecom Industry
3. Refer Unit 1.1.3 Impact of the Indian Telecom Industry on the Economy
4. Refer Unit 1.1.6 Role and Responsibilities of an In-building Wireless Solution Technician
5. Refer Unit 1.1.9 Growth Opportunities in the Telecom Sector for National Development

2. Prepare the Site for Deploying Wireless Solutions

Unit 2.1 - Understanding Wireless Connectivity and Site Assessment

Unit 2.2 - Analyzing Data and Preparing Installation Plans

Unit 2.3 - Implementing In-Building Wireless Solutions
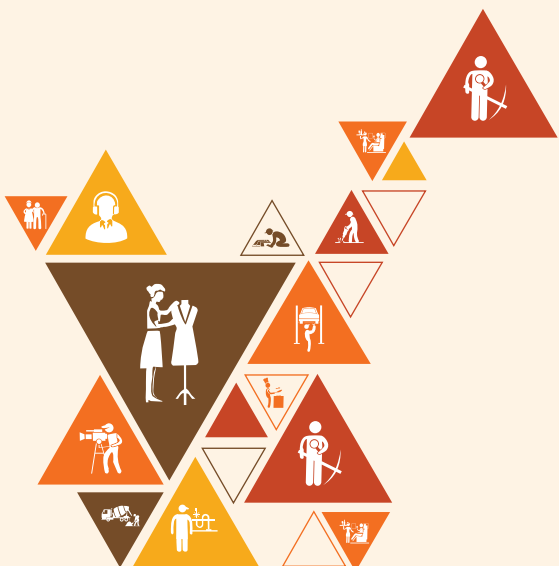
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Key Learning Outcomes

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

1. Discusses the need for uninterrupted wireless connectivity in high-rise buildings.
2. Explains how to study the floor plan for installing devices.
3. Discusses Ethernet cable requirements and the number of access points based on building size and client budget.

Unit 2.1: Understanding Wireless Connectivity and Site Assessment

Unit Objectives

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

1. Discusses the need for uninterrupted wireless connectivity in high-rise buildings.
2. Explain the working of survey tools.
3. Explains the method of assessing the site/location to determine the current status of wireless coverage, data rates, network capacity, and quality of service.
4. Explains the term radio frequency and dead spots and discusses the method of selecting the appropriate location for RF coverage holes and interference.
5. Explains the site survey methods as per the site location and available resources, including predictive, passive, and active methods.
6. Explains how to study the floor plan for installing devices.
7. Discusses the methods of measuring the space requirements for different devices in the network.

Resources to be Used

Whiteboard, projector, floor plan samples, wireless survey tools, site survey tools, laptops, internet access, wireless routers, RF analyzers, network coverage mapping software, pens, handouts, wireless connectivity test devices, site survey templates.

Say

- "Good morning, everyone! I'm excited to dive into today's topic about wireless connectivity and how we assess sites for ensuring optimal coverage and service."
- "By the end of this session, you'll be able to understand the critical need for uninterrupted wireless connectivity in high-rise buildings and how to effectively assess locations."
- "This knowledge is essential as it helps ensure seamless connectivity in environments where people rely on constant access to information, which is crucial for both businesses and residential spaces."

Ask

- "Have you ever experienced weak Wi-Fi signal in a building, like in a high-rise, where some areas are just 'dead zones'?"
- "When you use a Wi-Fi-enabled device, what factors do you think impact the speed and stability of your connection?"
- "Have you seen or heard about surveys being done to improve network connections in your workplace or home?"

Do

- Start the session by introducing the importance of uninterrupted wireless connectivity in buildings, particularly in high-rise structures.
- Explain the key concepts of wireless connectivity and the challenges posed by physical obstacles in large buildings.
- Introduce the tools used for wireless surveys and the basic principles of site assessment.
- Demonstrate how to use a floor plan to plan device installation and measure space for devices in a network setup.
- Walk through the various site survey methods (predictive, passive, active) and discuss which is suitable for different building types.
- Engage participants in understanding how RF (Radio Frequency) and dead spots impact wireless network performance.

Elaborate

- Discuss the need for uninterrupted wireless connectivity in high-rise buildings: Explain the challenges in maintaining consistent coverage due to building materials, heights, and layouts.
- Explain the working of survey tools: Describe how wireless survey tools help to identify coverage gaps, signal strength, and interference areas in buildings.
- Assess the site for wireless coverage: Illustrate how to evaluate the current state of wireless coverage, data rates, network capacity, and quality of service in different areas of the building.
- Define radio frequency and dead spots: Provide a simple explanation of RF and how dead spots are created, and discuss methods to overcome these issues.
- Explain the methods of site surveys: Discuss the three primary types of site surveys—predictive, passive, and active—and how each can be applied depending on available resources.
- Study floor plans for device installation: Discuss how floor plans help to determine optimal placement for wireless devices.
- Measure space requirements for devices: Explain how to calculate the necessary space for each device to ensure effective network installation and functionality.

Demonstrate

Show how to use a wireless survey tool to map out coverage areas and identify weak spots in a building's layout.

Activity

1. **Activity Name:** Wireless Site Assessment
2. **Objective:** To help participants understand the process of conducting a site survey and how to evaluate wireless connectivity.
3. **Type of activity:** Group activity
4. **Resources:** Wireless survey tools, site survey templates, floor plans
5. **Time Duration:** 30 minutes

6. Instructions:

- Divide participants into small groups and assign each group a floor plan of a building.
- Provide wireless survey tools to each group.
- Instruct groups to assess the wireless connectivity on the floor plan and identify areas where connectivity may be weak.
- Ask them to use the survey tools to determine the best locations for placing wireless devices to eliminate dead spots.
- Have each group present their findings and the rationale behind their device placement choices.

7. Outcome: Participants will learn how to conduct a site survey and use survey tools to optimize wireless network coverage.

Notes for Facilitation

- Ensure that participants are engaged by frequently asking for their input and experiences with wireless connectivity.
- Provide practical examples of how poor wireless coverage can affect daily activities in high-rise buildings.
- Explain the importance of choosing the right method of site survey based on the building's design and available resources.
- Emphasize how assessing wireless coverage is crucial for optimizing network performance in large buildings.
- Keep the session interactive by encouraging participants to ask questions and share insights.
- Encourage participants to consider real-world challenges while conducting site surveys in a variety of building types.

Unit 2.2: Analyzing Data and Preparing Installation Plans

Unit Objectives

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

1. Explains the working of software to enter the data collected from the site visit into the survey software for detailed analysis as per organizational standards.
2. Explains the method of recording survey results, including details such as signal spectrum, cable paths, mounting locations, and a list of activities for installation, hardware required, configuration recommendations, and licensing information.
3. Discusses the preparation of survey reports based on software recommendations.
4. Explains the methods of creating the installation design for access points and distribution units within the available space.
5. Discusses Ethernet cable requirements and the number of access points based on building size and client budget.

Resources to be Used

Survey software, laptops/computers with internet access, projector, installation templates, sample survey reports, network design tools, Ethernet cables, access point models, building layout designs, whiteboard/flip chart, markers, sample configurations, and reference manuals.

Say

- Good morning, everyone! I hope you're all excited to dive into today's session.
- Our objective today is to explore how we analyze data from site surveys and develop installation plans based on that data.
- Understanding this topic is key for you as it helps you translate data into actionable installation strategies, ensuring smooth deployments in real-world scenarios.

Ask

- Have you ever had to gather data during a site visit for a project or installation?
- What challenges do you think might arise when recording survey results like signal spectrum and cable paths?
- How do you think the size of a building or the client's budget might impact the number of access points required?

Do

- Start by introducing the session's objective and its relevance to the participants' roles.
- Present an overview of the survey software and its capabilities for entering collected data.
- Walk through the method of recording survey results and emphasize the details to capture, including signal spectrum, cable paths, mounting locations, and necessary hardware.
- Demonstrate how survey reports are generated based on software recommendations.
- Explain the process for creating an installation design with specific focus on access points and distribution units.
- Discuss the Ethernet cable requirements and access point considerations based on building size and budget constraints.
- Conclude the session with a summary and open up for questions and discussions.

Elaborate

- Explain how to enter survey data into software for detailed analysis according to organizational standards.
- Record key survey results such as signal spectrum, cable paths, mounting locations, and hardware requirements for installation.
- Prepare survey reports based on software recommendations to ensure accuracy and completeness.
- Design installation layouts for access points and distribution units based on available space.
- Calculate Ethernet cable requirements and determine the optimal number of access points based on building size and client budget.

Demonstrate

- Show how to enter data into the survey software, capturing signal spectrum, cable paths, and mounting locations.
- Walk through generating a survey report based on collected data.
- Create an example of an installation design, placing access points and distribution units in a building layout.

Activity

1. **Activity Name:** Designing an Installation Plan
2. **Objective:** To practice creating an installation design based on survey results and client requirements.
3. **Type of activity:** Group
4. **Resources:** Survey software, building layout designs, sample client requirements, installation templates
5. **Time Duration:** 30 minutes

6. **Instructions:**
   - Divide the group into smaller teams.
   - Provide each team with a sample building layout and client requirements.
   - Ask the teams to use the survey software to record data from the layout (signal spectrum, cable paths, etc.).
   - Have them create an installation design by placing access points and distribution units based on the data and requirements.
   - Ask each team to present their installation design, explaining their choices.
7. **Outcome:** Participants will be able to use survey software to create installation designs and justify their decisions based on survey data and client needs.

Notes for Facilitation

- Encourage participants to engage with the software hands-on to fully understand its functionalities.
- Keep the pace steady, allowing time for participants to grasp each concept before moving on.
- When discussing Ethernet cable requirements and access points, highlight the importance of matching the design with client needs and budget constraints.
- Emphasize the importance of accurate data entry during surveys for creating reliable installation plans.
- Reinforce the connection between survey data, software analysis, and installation design to ensure participants understand the full workflow.

Unit 2.3: Implementing In-Building Wireless Solutions

Unit Objectives 🎯

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

1. Discusses the various authorities to connect for procuring the necessary certificates for installation of in-building wireless solutions.
2. Discusses the suitable signal sources depending on capacity and coverage, such as off-air antennas (rooftop donor antennas), Base Transceiver Station (BTS), and micro cells.
3. Explains the different in-building wireless solutions depending on the available area, client requirements, and budget:
   • Passive DAS (Distributed Antenna System) using Bidirectional Amplifier System (BDA) for small facilities in suburban/rural areas.
   • Micro cells for areas of 5,000–15,000 sq ft.
   • Active DAS for areas of 1,000,000–5,000,000 sq ft.

Resources to be Used ⚙️

Whiteboard, markers, projector, presentation slides, handouts on wireless solutions, case study materials, access to wireless devices for demonstration, laptop with internet connection, visual aids of various wireless systems, example certificates for installation, charts showing coverage and capacity requirements, microphones for larger classes.

Say 💬

• Good morning, everyone! I hope you're ready for today's session on in-building wireless solutions.
• Today, we'll learn how to implement wireless systems within buildings, focusing on signal sources, system types, and installation procedures.
• Understanding these concepts is crucial because with wireless solutions, you can ensure that large and complex buildings have strong and reliable mobile communication.

Ask ask

• Have you ever experienced poor signal reception inside a building? How did it impact your experience?
• Have you noticed the antennas or cell towers placed on rooftops? What do you think their role is?
• Why do you think it's important to have strong wireless connectivity inside large buildings like offices or shopping malls?

Do

- Greet the class enthusiastically and introduce the topic of in-building wireless solutions.
- Begin with a discussion of the importance of wireless solutions in large buildings, emphasizing real-life examples like offices, airports, and malls.
- Introduce the concept of procuring necessary certificates and connect it to the regulatory authorities.
- Explain different types of signal sources, such as off-air antennas, BTS, and micro cells. Use visual aids to support understanding.
- Go into detail about each wireless solution (Passive DAS, Micro cells, Active DAS), and explain which solutions are appropriate for different spaces and needs.
- Encourage participants to ask questions and share thoughts throughout the session.

Elaborate

- Discuss the authorities involved in procuring certificates for in-building wireless installations.
- Explain the role of off-air antennas, Base Transceiver Stations (BTS), and micro cells as signal sources.
- Describe the characteristics of Passive DAS and how it works using Bidirectional Amplifier Systems (BDA) in small facilities.
- Explain the use of micro cells in mid-sized areas (5,000-15,000 sq ft) and the challenges they solve.
- Define Active DAS and its application in larger areas (1,000,000-5,000,000 sq ft) and its advantages.

Demonstrate

Show how a Passive DAS system works in a small facility by simulating signal amplification and distribution using a BDA.

Activity

1. **Activity Name:** Wireless Solutions System Design
2. **Objective:** Apply the concepts of different wireless systems to design a solution for a given building size.
3. **Type of Activity:** Group
4. **Resources:** Whiteboard, markers, handouts on different wireless solutions, charts on coverage requirements.
5. **Time Duration:** 30 minutes
6. **Instructions:**
   - Divide the class into small groups.
   - Provide each group with a building size and type (e.g., office, mall, hospital).
   - Ask them to choose the appropriate wireless system (Passive DAS, Micro cells, Active DAS) based on the building size and needs.
   - Have each group present their design to the class, explaining the rationale behind their choice.
   - Encourage discussion and feedback from the rest of the class.
7. **Outcome:** The groups will be able to demonstrate their understanding of the various wireless solutions and how to apply them based on building requirements.

Notes for Facilitation

- Ensure that all technical terms and concepts are explained clearly with real-life examples.
- Encourage group interaction and ensure that all participants contribute to the discussions.
- When discussing authorities for certificates, provide examples of local regulations or requirements in your region.
- Be prepared to clarify the differences between Passive DAS, Micro cells, and Active DAS by referencing real-life case studies or projects.
- Make sure to cover the practical considerations when choosing between these solutions based on client needs, area, and budget.
- Remain patient when explaining the technicalities; some participants may be unfamiliar with the specifics of in-building wireless systems.

Answers to Exercises for PHB

Multiple Choice Questions:

1. b. Employing repeaters and antennas to address signal attenuation
2. b. To measure signal strength, coverage, and network parameters
3. b. Selecting optimal antenna placements and using repeaters
4. b. To find where devices like routers and antennas should be placed
5. a. Local regulatory bodies and telecommunications departments

Descriptive Questions:

1. Refer Unit 2.1.1 Uninterrupted Wireless Connectivity in High-Rise Buildings
2. Refer Unit 2.1.2 Working of Survey Tools
3. Refer Unit 2.1.7 Measuring Space Requirements for Different Network Devices
4. Refer Unit 2.2.1 Data Entry and Survey Software Usage
5. Refer Unit 2.3.2 Signal Sources for Capacity and Coverage: Off-Air Antennas, BTS, and Micro Cells

3. Installation of Wireless Network Solutions

Unit 3.1 - Preparing for Installation and Ensuring Site Readiness

Unit 3.2 - Implementing Wireless Network Solutions

Unit 3.3 - Configuring and Testing Wireless Network Components

Unit 3.4 - Maintaining and Documenting the Wireless Network System
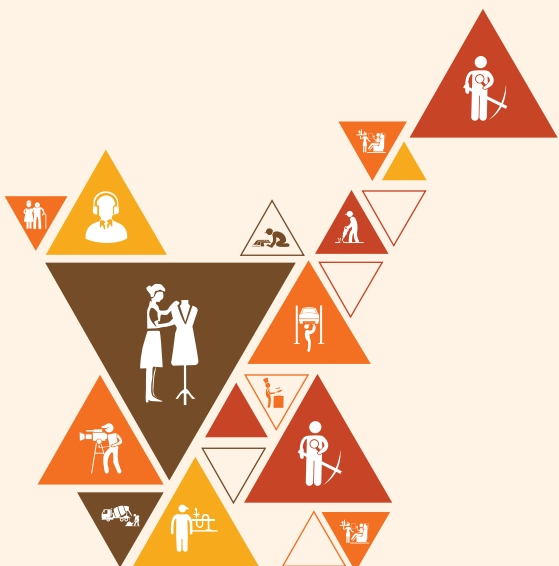
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Key Learning Outcomes

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

1. Explain the methods of interpreting the installation design layout for setting up the distributed antenna system
2. Explain the procedure to wear the PPE kit before the installation process.
3. Discuss the tools used to test the signal strength and quality
4. Demonstrate the use of PPE kit using video
5. Show the installation of software for each device

Unit 3.1: Preparing for Installation and Ensuring Site Readiness

Unit Objectives 🎯

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

1. Explains how to verify the installation tool kit is available, in working condition, and the installation site is free of obstructions.
2. Explains the procedure to wear the PPE kit before the installation process.
3. Discusses the technical support procedure with vendors.
4. Discusses the number of cells required based on coverage.
5. Explains how to identify the location where the microcell needs to be installed.

Resources to be Used ⚙️

Installation tool kit, PPE kit, technical support contact information, microcell installation guide, coverage map, projector, whiteboard, markers, handouts with technical specifications, relevant safety documents, and installation checklist.

Say 💬

- Good morning, everyone! I'm excited to dive into today's session on preparing for installation and ensuring site readiness.
- By the end of this session, you'll know how to check if your tools are ready, wear the right PPE, get support when needed, and ensure the site is perfect for installation.
- This session is crucial because ensuring everything is in place before installation can save you time, money, and avoid accidents on-site.

Ask ❓

- Have you ever been in a situation where you had to check if your tools were ready before starting a project?
- Can you think of a time when wearing the right safety gear made a difference in your work?
- Have you experienced a situation where technical support helped you resolve an issue while working on a project?

Do ✓

- Begin by introducing the importance of site readiness and tool preparation before installation.
- Walk through the checklist of tools and equipment needed for installation and ensure participants understand how to verify their condition.

- Discuss the importance of Personal Protective Equipment (PPE) and demonstrate how to wear it correctly before installation.
- Explain the process of contacting technical support and what information needs to be shared with vendors in case of issues.
- Show how to determine the number of cells needed for optimal coverage based on the site layout.
- Explain how to identify the correct installation location for the microcell and walk participants through the steps to ensure the area is clear.

Elaborate

- Ensure all necessary tools are available and in good working condition.
- Always use the proper personal protective equipment before starting any installation task.
- Know how to reach vendors for assistance with technical issues or queries.
- Calculate how many cells are necessary based on the specific site's layout and requirements.
- Learn how to find the best location for installing microcells to optimize coverage.

Demonstrate

- Show how to verify the installation tool kit for completeness and functionality.
- Demonstrate how to properly wear the PPE kit, highlighting key safety measures.
- Walk through the process of identifying an optimal installation site using a coverage map.

Activity

1. **Activity Name:** Microcell Installation Preparation
2. **Objective:** To practice verifying the installation tool kit, wearing PPE, and identifying the correct location for the microcell.
3. **Type of activity:** Group
4. **Resources:** Installation tool kit, PPE kit, coverage map, whiteboard, markers.
5. **Time Duration:** 25 minutes
6. **Instructions:**
   - Split the participants into small groups.
   - Each group will receive an installation tool kit and a PPE kit.
   - Groups will first check the tool kits to ensure all necessary tools are available and in working condition.
   - Then, they will wear the PPE kit correctly as per the guidelines provided.
   - Finally, using the coverage map, they will identify the best location for microcell installation on a mock layout of the site.
   - Groups will discuss their findings and present to the class.
7. **Outcome:** Participants will be able to verify installation tools, wear PPE properly, and identify suitable installation sites confidently.

Notes for Facilitation

- Encourage participants to ask questions during the demonstration to ensure they understand each step.
- Ensure that all participants have hands-on experience with verifying the tools and wearing the PPE kit.
- Emphasize the importance of safety throughout the session, reminding participants that it is a key part of the process.
- As you demonstrate the site identification process, stress the need for attention to detail when choosing locations for microcell installation.
- Always remind participants to keep the installation area free from obstructions for smooth and efficient work.

Unit 3.2: Implementing Wireless Network Solutions

Unit Objectives

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

1. Explains the methods of interpreting the installation design layout for setting up the distributed antenna system.
2. Discusses the suitable distribution technology for the area of the installation site, such as Cellular Signal Boosters, Active DAS, or microcells.
3. Explains the steps to install the donor antenna at the top of the building in the right direction to receive cellular signals (different antenna for different carriers).
4. Explains the steps to connect the bidirectional amplifier (BDA) to the signal source via coaxial cables to receive and amplify signals.
5. Explains the steps to install the couplers at designated areas in the building to receive signals from the BDA and split them in a specific ratio.
6. Explains the use of splitters to divide and distribute signals further within the building.
7. Demonstrates the steps to implement bidirectional amplifiers to boost coverage.
8. Shows the steps to implement the DAS system for enhanced coverage in large buildings.
9. Demonstrates the setup of microcells for improving coverage in blind spots.

Resources to be Used

Projector, laptop, wireless network setup equipment (e.g., Cellular Signal Boosters, Active DAS, microcells, bidirectional amplifiers, couplers, coaxial cables), antenna kits, measurement tools for signal strength, whiteboard, markers, installation guides, reference manuals, safety equipment, and handouts.

Say

- Good morning, everyone! I am excited to dive into today's topic on setting up wireless network solutions, which is essential for improving connectivity.
- Our objective today is to learn how to implement wireless network solutions effectively, covering the installation of distributed antenna systems and technologies like cellular boosters and DAS systems.
- Understanding these systems will allow you to design and install wireless networks that ensure smooth connectivity across various environments, which is crucial for today's tech-driven world.

Ask

- Have you ever experienced poor cellular signal reception inside a building? How did that affect your work or daily activities?
- What do you think could help in boosting the cellular signal within large buildings or spaces?
- When you use your mobile phone, how does the signal strength in different areas of your house or office impact your experience?

Do ☑

- Start by introducing the key technologies and their purpose for enhancing wireless coverage.
- Explain the installation of distributed antenna systems (DAS), beginning with interpreting the installation design layout.
- Discuss the different technologies suitable for different spaces, like Cellular Signal Boosters, Active DAS, and microcells, and guide the participants in choosing the best fit for specific scenarios.
- Walk through the steps for the installation of donor antennas at the top of the building, ensuring the correct direction for signal reception.
- Demonstrate how to connect bidirectional amplifiers (BDA) to signal sources and explain their role in amplifying the signal.
- Discuss the importance of couplers and show how to install them at strategic points in the building for optimal signal distribution.
- Explain and show how to use splitters to divide signals and distribute them further throughout the building.
- Provide a step-by-step guide on implementing microcells to enhance coverage in areas with weak signals.
- Conclude the session by discussing how to implement and test the entire wireless network setup for proper functionality.

Elaborate ⚙

- Interpret the installation design layout for a distributed antenna system.
- Select the right distribution technology for a given installation site (e.g., Cellular Signal Boosters, Active DAS, microcells).
- Install the donor antenna at the top of the building to receive signals effectively.
- Connect the bidirectional amplifier (BDA) to the signal source for amplification.
- Install couplers at designated areas for splitting the signals efficiently.
- Use splitters to distribute signals further inside the building.
- Implement bidirectional amplifiers to boost network coverage.
- Install the DAS system for broader coverage in large buildings.
- Set up microcells to address coverage in blind spots.

Demonstrate 🖼

Show the complete process of connecting a bidirectional amplifier (BDA) to the signal source and demonstrate how it amplifies signals effectively for distribution.

Activity

1. **Activity Name:** Antenna Setup for Optimal Signal Reception
2. **Objective:** To practice setting up antennas for optimal signal reception.
3. **Type of activity:** Group
4. **Resources:** Donor antenna kit, installation tools, measurement tools for signal strength, whiteboard.
5. **Time Duration:** 30 minutes
6. **Instructions:**
   - Divide the class into small groups.
   - Each group will receive an antenna kit and installation tools.
   - The task is to set up the donor antenna at a designated height and ensure it is directed towards the correct signal source.
   - Use signal strength measurement tools to check the effectiveness of the antenna's placement.
   - Discuss the results and ensure each group understands how to optimize antenna positioning.
7. **Outcome:** Participants will gain hands-on experience in antenna setup, understanding how to optimize placement for better signal reception.

Notes for Facilitation

- Maintain a dynamic pace throughout the session, ensuring that participants are actively engaged in both discussions and practical demonstrations.
- Encourage interaction and ask questions to assess understanding after each step of the installation process.
- Focus on the practical application of the tools and technologies being demonstrated.
- Ensure that participants understand the importance of safety when working with antennas and signal amplifiers.
- Emphasize the significance of selecting the appropriate technology (e.g., Cellular Signal Boosters, DAS) based on the specific needs of the installation site.
- Help the participants troubleshoot any challenges they face during the hands-on activity to ensure they can apply the skills learned.

Unit 3.3: Configuring and Testing Wireless Network Components

Unit Objectives 🎯

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

1. Explains the steps to install the system controller software to manage and monitor the Active DAS system.
2. Explains the steps to configure the central hub for appropriate signal frequency and power levels.
3. Explains the configuration of remote units to receive and amplify signals correctly.
4. Explains the configuration of antennas for optimal coverage and signal strength.
5. Explains the configuration of amplifiers to ensure desired signal amplification.
6. Explains the steps to connect small cells to the existing network, configure them, and test the connection.
7. Demonstrates the installation of software for each device.
8. Demonstrates how to use monitoring software to oversee the network.
9. Explains how to use a cable tester or media tester to check proper cable functioning.
10. Explains the use of a power meter to measure power levels at various DAS system points.
11. Explains the Sweep Test and PIM Test to check the quality of transmitted signals.
12. Explains the spectrum analyzer to measure noise levels throughout the building.
13. Explains load testing and stress testing of the system.
14. Explains how to test communication between the HEU, remote units, and other components.
15. Explains how to measure reflected signal quality or loss using TDR or OTDR tools.
16. Demonstrates the steps to check the signal strength in a network.

Resources to be Used ⚙️

System controller software, central hub, remote units, antennas, amplifiers, small cells, cable tester, media tester, power meter, sweep test equipment, PIM test equipment, spectrum analyzer, TDR tools, OTDR tools, monitoring software, devices for installation, network test equipment.

Say 💬

*   Welcome! Today we will learn how to configure and test various wireless network components to ensure optimal signal quality and connectivity.
*   Our goal is to understand the step-by-step process of setting up and testing systems like the Active DAS, antennas, amplifiers, and small cells.
*   Mastering this topic is essential because it ensures smooth communication and reliable wireless coverage for modern networks.

Ask 🗨ask

- Have you ever experienced poor signal quality or dropped calls on your phone? What do you think could cause that?
- What are some tools you have used in the past to check your home internet or network connections?
- Why do you think it's important for wireless networks to be properly configured and tested?

Do ✓

- Start by introducing the key components in the wireless network: system controllers, central hubs, remote units, antennas, and amplifiers.
- Explain the importance of signal frequency and power level configurations.
- Walk through the installation steps for each device (system controllers, central hubs, remote units, and antennas).
- Demonstrate how to configure the amplifiers and check for signal strength.
- Explain how to connect small cells to the existing network, configure them, and test connectivity.
- Show how to use various testing equipment like a cable tester, power meter, and spectrum analyzer to evaluate network performance.
- Walk through the process of conducting sweep tests and PIM tests to ensure signal quality.
- Demonstrate how to use monitoring software to oversee network operations and spot issues.

Elaborate ⚙

- Install system controller software to manage and monitor the Active DAS system.
- Configure the central hub for correct signal frequency and power levels.
- Set up remote units to receive and amplify signals appropriately.
- Configure antennas for optimal coverage and signal strength.
- Set up amplifiers to achieve the desired level of signal amplification.
- Connect and configure small cells within the existing network, ensuring smooth connectivity.
- Demonstrate software installation for each device involved in the system.
- Use monitoring software to track network performance and detect any issues.
- Test cables using a cable tester or media tester to ensure they are functioning properly.
- Measure power levels at various points using a power meter to assess signal integrity.
- Perform Sweep and PIM tests to evaluate transmitted signal quality.
- Use a spectrum analyzer to check for noise interference in the network.
- Conduct load and stress tests to evaluate the system's performance under heavy traffic.
- Test communication between the HEU, remote units, and other components to ensure connectivity.
- Use TDR or OTDR tools to measure reflected signal quality or loss.
- Test signal strength in the network and check for weak areas.

Demonstrate

Show how to install the system controller software and use it to monitor and manage the Active DAS system.

Activity

1. **Activity Name:** Signal Configuration and Testing

2. **Objective:** To practice configuring antennas, amplifiers, and small cells while using a power meter and cable tester to verify performance.

3. **Type of activity:** Group

4. **Resources:** Central hub, remote units, antennas, amplifiers, small cells, power meter, cable tester, media tester.

5. **Time Duration:** 25 minutes

6. **Instructions:**

   • Divide the participants into small groups.

   • Each group will set up antennas and amplifiers for optimal signal strength.

   • Use the power meter to check the power levels at various points in the system.

   • Test cables using the cable or media tester to ensure correct connections.

   • Configure and test small cells for network connectivity.

   • After completing the tasks, ask each group to share their results and discuss the challenges faced during the process.

7. **Outcome:** Participants will gain hands-on experience in configuring wireless components and using testing tools to evaluate network performance.

Notes for Facilitation

• Ensure that all participants have access to the required equipment for the activity and demonstrations.

• Encourage participants to actively engage with the testing equipment and ask questions during the demonstration.

• Provide additional explanations if any equipment or procedure seems unclear to the participants.

• Stress the importance of proper configurations and testing to avoid network performance issues.

• Highlight how each component (like amplifiers and antennas) impacts the overall system and signal strength.

• Reiterate that consistent testing and monitoring are key to maintaining a high-quality wireless network.

Unit 3.4: Maintaining and Documenting the Wireless Network System

Unit Objectives

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

1. Discusses the importance of support documentation.
2. Explains how to maintain asset details with their nomenclature.
3. Discusses the record maintenance process, including installation, maintenance, upgrades, and repairs.
4. Explains how to document the maintenance schedule (daily, weekly, monthly).
5. Shows the steps to prepare a maintenance document for planned maintenance.
6. Explains the DAS system to staff members responsible for maintaining the system.
7. Shows the function of each device in the DAS system through a video.

Resources to be Used

Whiteboard, markers, projector, computer, video of DAS system function, handouts on maintenance schedules, templates for asset details and maintenance documentation, training manuals, laptops or tablets for participants to review templates and create documents.

Say

- "Good morning, everyone! I'm excited to dive into today's session where we'll learn how to maintain and document a wireless network system."
- "Our objective today is to understand the importance of proper documentation and maintenance schedules for wireless networks and how they help ensure smooth operation."
- "You need to understand this topic because without proper documentation and maintenance, the performance and longevity of your network system can be compromised, leading to downtime and costly repairs."

Ask

- "How many of you have worked with a wireless network system before?"
- "Can anyone share an example of how important it is to keep track of maintenance for any equipment you use daily?"
- "What do you think would happen if you didn't maintain the details of your devices and systems over time?"

Do

- Greet the participants and introduce the session.
- Share the learning objectives for the session.
- Explain that the focus will be on the importance of support documentation, maintaining asset details, and the process of record-keeping.
- Present the topics and explain the relationship between maintaining documentation and network efficiency.
- Show the video of DAS system functionality to illustrate its operation.
- Lead a discussion on the key components of the wireless network system and their maintenance needs.
- Explain the significance of a maintenance schedule and its role in reducing network downtime.
- Guide participants through preparing a maintenance document for planned maintenance, step-by-step.
- Use the handouts to illustrate examples of maintenance records and schedules.

Elaborate

- Discuss the importance of support documentation in maintaining a reliable wireless network system.
- Explain how to maintain asset details with clear nomenclature for easy identification.
- Describe the record-keeping process, highlighting the importance of documenting installations, maintenance, upgrades, and repairs.
- Illustrate how to document the maintenance schedule and its types: daily, weekly, monthly.
- Outline the steps to prepare a maintenance document for planned maintenance, ensuring timely checks and updates.
- Introduce the concept of the DAS system and its function in wireless networks, especially for staff responsible for maintenance.
- Show how each device in the DAS system functions and how understanding these roles can help with troubleshooting and repairs.

Demonstrate

Show a video illustrating the function of the DAS system and how each device works together to maintain the network.

Activity

1. **Activity Name:** Preparing a Maintenance Schedule
2. **Objective:** Understand how to create and maintain a maintenance schedule for network systems.
3. **Type of activity:** Individual
4. **Resources:** Templates for maintenance schedules, laptop or tablet, handouts on network documentation
5. **Time Duration:** 30 minutes

6. **Instructions:**
   - Provide participants with a template for creating a network maintenance schedule.
   - Ask them to fill out a maintenance schedule based on their understanding of daily, weekly, and monthly tasks.
   - After completing the task, have participants share their schedules with a peer for feedback.
7. **Outcome:** Participants will be able to create a maintenance schedule for a wireless network system, ensuring all critical tasks are addressed at the appropriate intervals.

Notes for Facilitation

- Ensure participants understand the significance of proper documentation and its impact on network performance.
- Engage participants with real-life examples of how proper maintenance can prevent costly repairs and network downtime.
- Remind participants that a clear maintenance schedule helps in preventing problems before they occur.
- Highlight the role of asset details in asset tracking and troubleshooting.
- Encourage participants to actively participate in the video demonstration, making notes of the devices and their functions in the DAS system.

Answers to Exercises for PHB

Multiple Choice Questions:

1. b. To plan antenna and equipment placement
2. a. Signal analyser
3. d. Follow the manufacturer's procedure
4. d. Laptop
5. b. To enable device configuration and communication

Descriptive Questions:

1. Refer Unit 3.2.1 Methods for Interpreting Installation Design Layouts in Distributed Antenna System Setup
2. Refer Unit 3.1.2 Procedure for Wearing PPE Kit before Installation
3. Refer Units:
   - Unit 3.3.9 Ways to Use a Cable Tester or Media Tester to Check Proper Cable Functioning
   - Unit 3.3.10 Use of a Power Meter to Measure Power Levels at Various DAS System Points
   - Unit 3.3.11 Sweep Test and PIM Test: An In-Depth Examination of Signal Quality Verification
   - Unit 3.3.12 Spectrum Analyser for Measuring Noise Levels in Buildings
4. Refer Unit 3.1.2 Procedure for Wearing PPE Kit before Installation
5. Refer Unit 3.3.7 Installation of Software for Devices
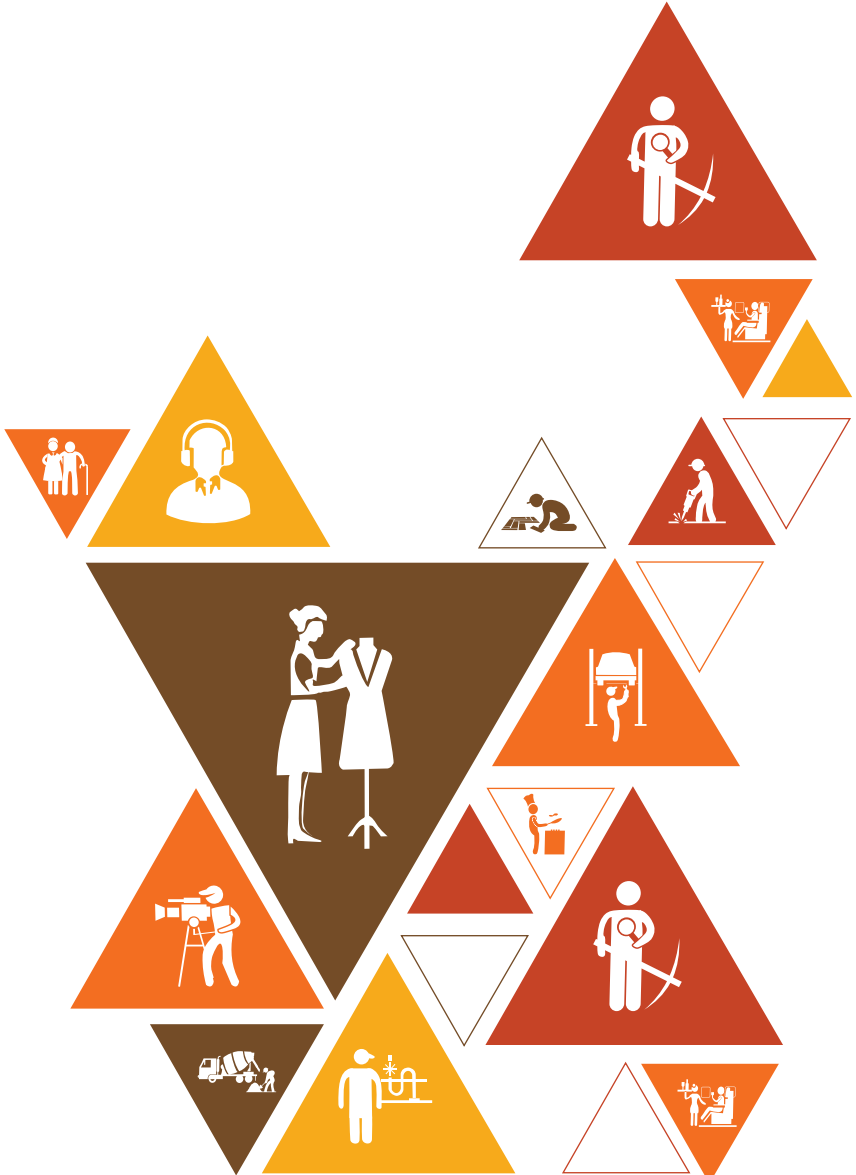
4. Maintain Network at Site

Unit 4.1 - Performing Maintenance and Resolving System Issues

Unit 4.2 - Communicating and Documenting Maintenance Activities
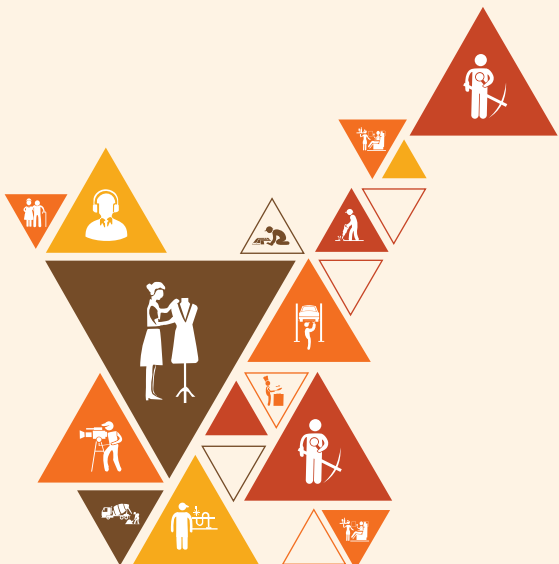
Key Learning Outcomes

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

1. Discusses the importance of planned scheduled maintenance and cleaning of devices (daily, weekly, monthly) and informs the network operation team and supervisors about the maintenance planned for the day.

2. Discusses the information to be provided to customers about the maintenance to be carried out and any possible deterioration in system performance.

3. Demonstrates the documentation of maintenance work.

Unit 4.1: Performing Maintenance and Resolving System Issues

Unit Objectives 🎯

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

1. Discusses the importance of planned scheduled maintenance and cleaning of devices (daily, weekly, monthly) and informs the network operation team and supervisors about the maintenance planned for the day.

2. Explains the steps to inspect system components for wear and tear, corrosion, or damage (e.g., antennas, cables, amplifiers, and signal processing elements).

3. Discusses the steps to test system performance for degradation or other performance issues.

4. Explains the methods of cleaning dust from the system periodically without damaging intricate parts.

5. Discusses regular checks to ensure the temperature is maintained in the control room and DAS devices are not overheating.

6. Explains the use of the setup wizard to update firmware and software for all system components whenever required.

7. Explains how to verify alarms and alerts are configured properly and are functioning.

8. Explains how to identify faulty devices by checking error logs or using network diagnostic tools and isolating them.

9. Explains how to test devices to identify the cause of the problem.

10. Discusses repair or replacement methods for different devices based on the nature of the problem using the manual.

11. Explains the mechanism to check if the problem has been resolved.

12. Demonstrates the cleaning and dusting of system components without damaging intricate parts.

13. Demonstrates the steps to install or update firmware in all systems.

14. Demonstrates how to interpret error log reports.

Resources to be Used ⚙️

Whiteboard, markers, projector, system components (e.g., antennas, cables, amplifiers), maintenance tools, dusting equipment, setup wizard software, firmware and software update manuals, network diagnostic tools, error log reports, control room temperature monitoring tools.

Say 💬

- Good morning everyone! I hope you're ready to dive into an essential part of system management today.

- In this session, we'll be exploring how to perform maintenance and resolve system issues effectively to ensure everything is running smoothly.

- Understanding these tasks is crucial because proper maintenance can prevent system failures and help in maintaining the integrity of the network.

Ask ask

- How often do you clean or maintain your personal devices, like your phone or laptop?
- Have you ever had a device break down unexpectedly? What did you do to resolve the issue?
- What do you think could happen if the system components were not properly maintained?

Do ✓

- Start by introducing the concept of scheduled maintenance and explain its importance.
- Discuss with participants the different types of maintenance (daily, weekly, monthly) and explain how each affects system longevity.
- Explain how to inspect system components for signs of wear, corrosion, or damage.
- Walk through the process of cleaning the system without damaging sensitive parts.
- Discuss how to monitor and maintain the correct temperature in the control room.
- Go over the use of setup wizards to update firmware and software and why it's necessary.
- Demonstrate how to verify and troubleshoot alarms and alerts.
- Teach participants how to identify faulty devices and resolve issues using logs and diagnostic tools.
- Explain and show the process for testing and repairing or replacing components as necessary.

Elaborate

- Discuss the importance of performing planned scheduled maintenance to ensure smooth operation and avoid unexpected failures.
- Inspect system components regularly for damage and wear such as corrosion in cables or signal degradation in antennas.
- Test system performance by monitoring key metrics like signal strength or connectivity to detect any issues.
- Clean the system by safely removing dust without damaging internal parts, such as using air blowers or soft cloths.
- Monitor room temperature and the health of DAS devices to prevent overheating or malfunction.
- Update system firmware and software regularly using setup wizards to keep all components running on the latest versions.
- Ensure all alarms and alerts are correctly configured and functioning so that any issue is detected early.
- Use network diagnostic tools and error logs to identify malfunctioning devices and isolate the issue.
- Test each device by following troubleshooting steps to identify the root cause of any problem.
- Repair or replace faulty devices by following the manufacturer's manual for correct procedures.
- Verify that issues are resolved through additional tests and checks after repairs.

Demonstrate

Demonstrate how to clean a system component such as an amplifier or antenna without damaging delicate parts using appropriate tools.

Activity

1. **Activity Name:** Maintenance Schedule and Troubleshooting
2. **Objective:** To practice scheduled maintenance and identify faults using error logs and diagnostic tools.
3. **Type of activity:** Group
4. **Resources:** Whiteboard, markers, sample error logs, network diagnostic tools, system components.
5. **Time Duration:** 25 minutes
6. **Instructions:**
   - Divide participants into small groups.
   - Assign each group a maintenance schedule (daily, weekly, monthly).
   - Ask each group to create a maintenance checklist with tasks related to system performance checks, cleaning, and inspecting components.
   - After 10 minutes, switch the groups' tasks to troubleshooting faulty components using provided error logs and diagnostic tools.
   - Each group will report on their findings and solutions.
7. **Outcome:** Participants will gain hands-on experience in creating maintenance schedules and troubleshooting issues effectively.

Notes for Facilitation

- Ensure all participants understand the importance of preventive maintenance and why it should be a regular activity.
- Encourage questions throughout the session and provide real-life examples of how regular maintenance can prevent larger issues.
- For topics like error log interpretation and troubleshooting, be patient as some participants may need more guidance in understanding the diagnostic tools.
- Demonstrate the cleaning and inspection process clearly and slowly, showing the safe handling of delicate components.
- When discussing firmware updates, ensure participants understand the need to follow the manual carefully for each system to avoid mistakes.

Unit 4.2: Communicating and Documenting Maintenance Activities

Unit Objectives

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

1. Discusses the details to be documented about repairs, including the cause of the problem, steps taken to repair it, parts replaced, and any software updates performed.
2. Discusses the method of informing customers and other authorities of planned maintenance activities.
3. Discusses the information to be provided to customers about the maintenance to be carried out and any possible deterioration in system performance.
4. Shows how to prepare a maintenance schedule for system components.

Resources to be Used

Whiteboard, markers, projector, laptop, maintenance documentation templates, maintenance schedule templates, sample repair logs, customer communication samples, case studies, handouts with guidelines for maintenance activities, and any online documentation tools.

Say

- Good morning, everyone! I hope you're all doing well today!
- In today's session, we'll explore how to effectively communicate and document maintenance activities, a crucial skill for ensuring smooth system operations and customer satisfaction.
- Understanding this topic is essential because proper documentation and communication of maintenance activities help maintain system reliability, improve customer trust, and streamline repairs and updates.

Ask

- Have you ever had to explain to a customer about system performance degradation after maintenance?
- How do you usually inform others when your system is scheduled for maintenance or repairs?
- What kind of information do you think should be documented when you carry out repairs or updates?

Do

- Introduce the topic and provide an overview of why documenting maintenance activities and communicating them properly is critical.
- Present the objectives of the session clearly so that everyone understands the goals for the day.
- Explain each point step by step, providing practical examples of how to document maintenance and communicate with stakeholders.

- Use the provided resources such as templates and samples to guide the trainees through the documentation process.
- Demonstrate how to create a maintenance schedule for system components and explain the importance of timely updates.
- Emphasize the importance of customer communication and show examples of how to inform customers about possible impacts of maintenance.
- Encourage trainees to participate actively in the activity and ask questions if something is unclear.

Elaborate

- Document the cause of the problem: Recognize how identifying and recording the root cause of issues is essential for future reference and decision-making.
- Record the steps taken for repair: Emphasize the need for clear documentation on the procedures followed for repairs to ensure accuracy and consistency.
- List the parts replaced: Understand the importance of tracking parts replaced during repairs for inventory and system maintenance records.
- Include software updates: Acknowledge that software updates should be documented for troubleshooting and auditing purposes.
- Inform customers about planned maintenance: Clarify the steps involved in communicating maintenance schedules to clients in advance to avoid disruptions.
- Provide details of system performance: Highlight the importance of informing customers about any expected performance changes and the impact of the maintenance.
- Prepare a maintenance schedule: Learn how to develop a detailed and realistic maintenance schedule for system components to ensure optimal functioning.

Demonstrate

- Show how to fill out a maintenance log for a repair, including documenting the cause of the issue, the repair steps, parts replaced, and software updates performed.
- Demonstrate how to communicate a planned maintenance schedule to a customer, ensuring clarity and transparency about potential service interruptions.

Activity

1. **Activity Name:** Maintenance Documentation and Communication
2. **Objective:** To understand the documentation process for maintenance activities and how to effectively communicate them to customers.
3. **Type of activity:** Group
4. **Resources:** Maintenance documentation templates, maintenance schedule templates, projector, laptop.
5. **Time Duration:** 30 minutes

6. Instructions:

- Divide participants into small groups.
- Provide each group with a sample maintenance issue and ask them to document the cause, steps taken, parts replaced, and software updates in a maintenance log.
- After completing the log, the groups will prepare a customer communication informing them about the planned maintenance and any possible performance impact.
- Each group will present their documentation and customer communication to the class for feedback and discussion.

7. Outcome: Participants will be able to document maintenance activities accurately and communicate the necessary information to customers effectively.

Notes for Facilitation

- Engage the participants by asking them to share their experiences with maintenance activities in their current or past roles.
- Ensure that all groups understand the importance of clear, concise, and accurate communication in the maintenance documentation process.
- Clarify that well-documented maintenance logs help in building a comprehensive service history for systems, aiding future repairs.
- Encourage participants to focus on the customer's perspective while preparing communication to ensure it is understandable and informative.

Answers to Exercises for PHB

Multiple Choice Questions:

1. b. To ensure optimal performance
2. b. Network operation team and supervisors
3. b. To prevent misunderstandings and complaints about system performance
4. b. Daily, weekly, and monthly
5. b. Maintenance work details

Descriptive Questions:

1. Refer Unit 4.1.1 Importance of Planned Scheduled Maintenance and Cleaning of Devices Topic: Benefits of Scheduled Maintenance
2. Refer Unit 4.2.3 Customer Communication on Maintenance and System Performance
3. Refer Unit 4.1.1 Importance of Planned Scheduled Maintenance and Cleaning of Devices Topic: Informing the Network Operation Team and Supervisors
4. Refer Unit 4.1.4 Methods for Cleaning Dust from Systems Without Damaging Intricate Parts
5. Refer Unit 4.2.1 Documenting Repair Details

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

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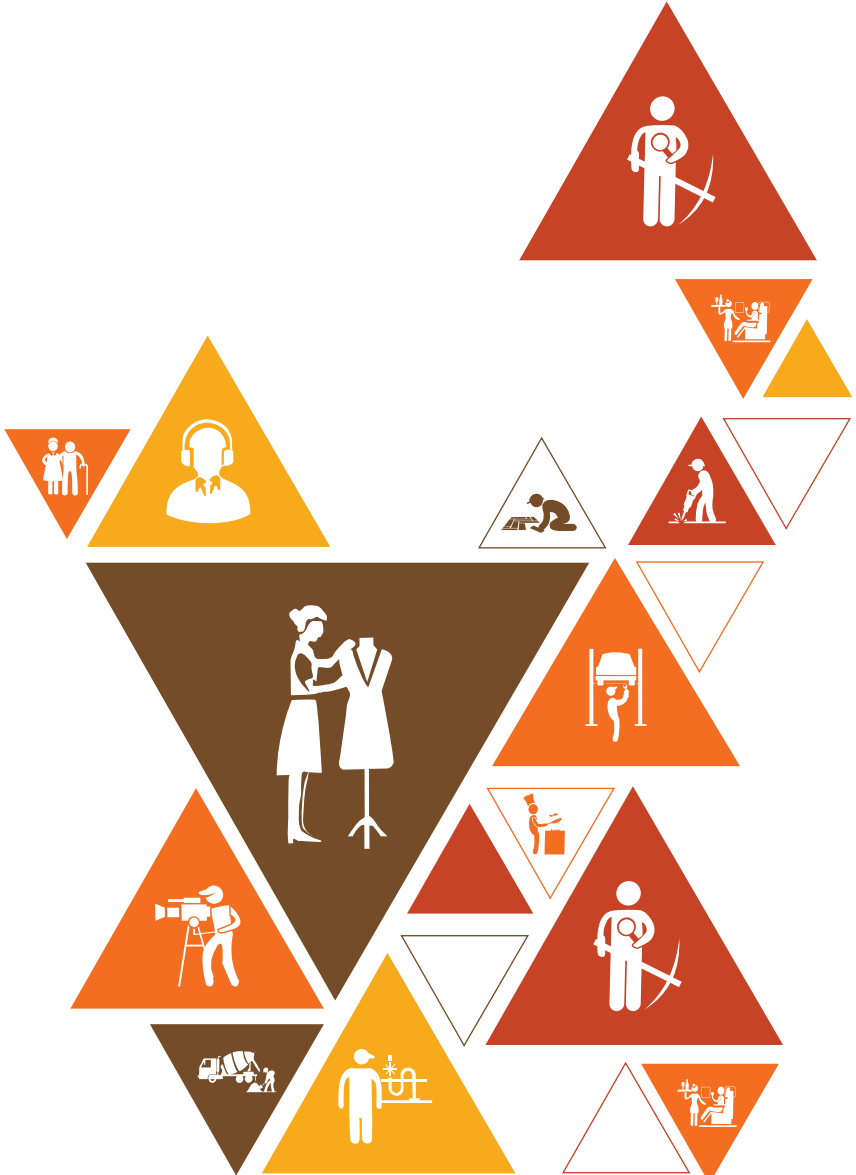
Key Learning Outcomes

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

1. Explain about the work place health and safety
2. Differentiate various health hazards
3. Demonstrate various first aid techniques
4. Importance of safety at workplace
5. Understand Basic hygiene Practices and hand washing techniques
6. Explain the need for social distancing
7. Understand the reporting of hazards at workplace
8. Explain e-waste and process of disposing them
9. Explain Greening of jobs

Unit 5.1: Workplace Health & Safety

Unit Objectives 🎯

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

1. Understand about workplace health and safety
2. Explain tips to design a safe workplace
3. Explain precautions to be taken at a workplace

Resources to be Used ⚙️

Presentation slides or visual aids, Examples of safe workplace designs, Visuals demonstrating precautions at a workplace.

Say 💬

- Today, we're diving into a topic that's crucial for each one of us - Workplace Health & Safety. Let's make our workspace not just productive but also safe and secure!
- Our objective today is to understand the fundamentals of workplace health and safety. We'll explore how to design a safe workplace and discuss important precautions. This knowledge is essential for creating a work environment that prioritizes our well-being.
- Workplace safety isn't just a legal requirement; it's about our well-being. Knowing the ins and outs of creating a safe workspace ensures that we can all go home healthy and sound every day.

Ask 🔲

- Can you share an experience where workplace safety measures made a significant difference?
- What are some common challenges you've observed regarding safety in your workplace?
- Why is it important for employees to actively contribute to maintaining a safe work environ-ment?

Do ✓

- Discuss the importance of workplace health and safety.
- Outline the session objectives.

Elaborate

Understanding Workplace Health and Safety

- Provide an overview of the concept, legal aspects, and its impact on employees and produc-tivity.

Designing a Safe Workplace and Precautions

- Share tips and best practices for designing a safe workplace.
- Discuss specific precautions that should be taken at a workplace.

Demonstrate

- Demonstrate examples of safe workplace designs and explain the reasoning behind them.

Activity

1. **Activity name:** Safety Check: Design Your Workspace
2. **Objective:** Apply knowledge of safe workplace design.
3. **Type of Activity:** Group
4. **Resources:** Templates for designing workspaces, markers, and flip charts.
5. **Time Duration:** 25 minutes
6. **Instructions:**
   - Groups design a safe workspace using provided templates, considering safety aspects dis-cussed.
7. **Outcome:** Improved understanding of practical implementation of safe workspace princi-ples.

Notes for Facilitation

- Encourage open discussions and questions.
- Emphasize that safety is everyone's responsibility.
- Highlight the role of each individual in maintaining a safe workplace.
- Emphasize the psychological impact of a safe environment on employee well-being and produc-tivity.
- Encourage a proactive approach towards safety, such as reporting hazards and suggesting im-provements.

Unit 5.2: Different types of Health Hazards

Unit Objectives

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

1. Understand the health hazards
2. Demonstrate First Aid Techniques

Resources to be Used

Presentation slides or visual aids, First aid kits for demonstration purposes, Handouts on com-mon health hazards.

Say

- Today's session is crucial as we delve into 'Different Types of Health Hazards' and learn practi-cal first aid techniques. Let's ensure we are equipped with the knowledge to keep ourselves and our colleagues safe.
- Our goal today is twofold: Firstly, to understand various health hazards that can affect us in our daily lives. Secondly, we'll go beyond awareness and dive into practical first aid techniques. This knowledge can be a lifesaver in emergencies.
- In our unpredictable lives, accidents and health emergencies can happen anytime. Knowing how to identify health hazards and administer basic first aid can make a significant difference, potentially saving lives.

Ask

- Can you share an instance where knowing first aid made a difference in handling a health emergency?
- What are some common health hazards you think people might encounter in their daily lives?
- How can awareness of health hazards contribute to a safer environment at home or work?

Do

- Briefly introduce the importance of understanding health hazards.
- Outline the session objectives.

Elaborate

Understanding Health Hazards

- Discuss various health hazards such as physical, chemical, biological, ergonomic, and psy-chosocial.
- Explain how these hazards can manifest in different settings.

First Aid Techniques

- Cover basic first aid techniques, including CPR, wound care, and responding to common health emergencies.

Demonstrate

- Demonstration common health hazards using visuals or case studies, Discuss preventive measures.

Activity

1. **Activity name:** First Aid Workshop
2. **Objective:** Apply first aid techniques.
3. **Type of Activity:** Group
4. **Resources:** First aid kits, mannequins for CPR practice, bandages, and other first aid sup-plies.
5. **Time Duration:** 30 minutes
6. **Instructions:**
   - Groups practice basic first aid techniques learned during the session.
7. **Outcome:** Enhanced confidence and practical application of first aid skills.

Notes for Facilitation

- Encourage active participation and questions.
- Maintain a supportive and open learning environment.
- Emphasize the importance of remaining calm and focused during health emergencies.
- Reinforce that first aid is not a substitute for professional medical care but can significantly im-prove outcomes before help arrives.
- Encourage participants to share personal experiences related to health hazards and first aid, fostering a collaborative learning environment.

Unit 5.3: Importance of Safe Working Practices

Unit Objectives

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

1. Explain Basic Hygiene Practices
2. Understand the importance of Social Distancing
3. Demonstrate the safe working practices

Resources to be Used

Presentation slides or visual aids, Handouts on basic hygiene practices and social distancing, Personal protective equipment (PPE) for demonstration purposes.

Say

- Today, we're diving into the 'Importance of Safe Working Practices.' It's not just about rules; it's about creating a healthy and secure work environment for all of us.
- Our aim today is to understand and appreciate the importance of basic hygiene practices, the significance of social distancing, and how to practically implement safe working practices. Let's ensure our workplaces are not just productive but also safe spaces for everyone.
- Safe working practices are the cornerstone of a healthy workplace. By understanding and im-plementing them, we contribute to our own well-being and the well-being of our colleagues. It's about fostering a culture of safety and respect.

Ask

- Can you share an example of how safe working practices have made a positive impact on your work environment?
- In what ways have you seen basic hygiene practices being emphasized in your workplace?
- How do you think social distancing contributes to a safer workplace, especially in the current context?

Do

- Briefly introduce the importance of safe working practices.
- Outline the session objectives.

Elaborate

Basic Hygiene Practices

- Discuss the significance of personal hygiene, handwashing, and maintaining a clean work-space.

Importance of Social Distancing

- Explain the concept of social distancing and its relevance in preventing the spread of infec-tions.
- Relate it to the current context and public health guidelines.

Safe Working Practices Demonstration

- Demonstrate the correct way to wear and dispose of PPE.
- Illustrate proper techniques for maintaining social distance in various workplace scenarios.

Demonstrate

Conduct a practical demonstration of implementing safe working practices in a simulated workplace scenario.

Activity

1. **Activity name:** Safety Drill (30 minutes)
2. **Objective:** Apply safe working practices.
3. **Type of Activity:** Group
4. **Resources:** PPE, visual aids, workplace layout.
5. **Time Duration:** 30 minutes
6. **Instructions:**
   - Groups perform a safety drill, incorporating basic hygiene practices and social distancing.
7. **Outcome:** Improved understanding and practical application of safe working practices.

Notes for Facilitation

- Encourage open discussions on experiences and concerns related to safety.
- Foster a non-judgmental environment to promote learning.
- Emphasize that safe working practices are everyone's responsibility.
- Stress the importance of adapting these practices to the specific context of the workplace.
- Encourage participants to share personal anecdotes about the positive impact of safe working practices in their lives.

Unit 5.4: Reporting Safety Hazards

Unit Objectives

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

1. Discuss the process of reporting in case of emergency (safety hazards)
2. Understand methods of reporting hazards

Resources to be Used

Presentation slides or visual aids, Examples of emergency contact information, Handouts on reporting procedures.

Say

- Today, we're delving into the critical topic of 'Reporting Safety Hazards.' It's not just about knowing the procedures but understanding why reporting is crucial for our collective well-being.
- Our goal today is to discuss the process of reporting safety hazards, especially in emergencies. We'll understand the methods and explore why our proactive reporting is vital for maintaining a safe working environment.
- Safety is everyone's responsibility. By the end of today's session, you'll be equipped with the knowledge needed to effectively report safety hazards, ensuring a prompt and appropriate re-sponse to emergencies.

Ask

- Can you share a situation from your own experience where reporting a safety hazard led to a positive outcome?
- How often do you review emergency contact information at your workplace?
- What challenges do you think individuals might face when it comes to reporting safety hazards?

Do

- Introduce the importance of reporting safety hazards.
- Outline the session objectives.

Elaborate

Process of Reporting in Emergencies

- Discuss the step-by-step process of reporting safety hazards during emergencies.

Methods of Reporting Hazards

- Explore different methods of reporting, including direct communication, use of emergency hotlines, and digital reporting systems.

Importance of Timely Reporting

- Emphasize the impact of timely reporting on preventing accidents and minimizing damage.

Demonstrate

- Simulate an emergency scenario and guide participants through the process of reporting. Demonstrate the use of various reporting methods.

Activity

1. **Activity name:** Reporting Drills
2. **Objective:** Practice reporting safety hazards.
3. **Type of Activity:** Group
4. **Resources:** Emergency contact information, reporting forms.
5. **Time Duration:** 30 minutes
6. **Instructions:**
   - Groups participate in reporting drills based on different emergency scenarios.
7. **Outcome:** Improved understanding and confidence in reporting procedures.

Notes for Facilitation

- Encourage a proactive attitude toward reporting safety hazards.
- Foster a non-punitive reporting culture to ensure open communication.
- Emphasize the importance of reporting even minor safety concerns.
- Stress the role of confidentiality in reporting to encourage openness.
- Discuss any specific reporting protocols or systems in place in the participants' workplaces.

Unit 5.5: Waste Management

Unit Objectives

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

1. Understand what is e-waste
2. Understand the concept of waste management
3. Explain the process of recycling of e-waste

Resources to be Used

Visual aids or slides on e-waste, Samples of e-waste products, Information on local waste man-agement facilities, Recycling bins or containers.

Say

- Today, we're diving into a crucial topic – 'Waste Management.' It's not just about cleaning up; it's about understanding what we discard and how it impacts the environment.
- Our objective today is to explore the world of waste management, with a special focus on e-waste. By the end, you'll understand what e-waste is, the concept of waste management, and the recycling process, contributing to a cleaner, greener planet.
- The way we manage waste, especially electronic waste, has a direct impact on our environ-ment. Understanding this process empowers us to make informed choices and actively partici-pate in creating a sustainable future.

Ask

- Can you name some electronic devices you've discarded recently, and what did you do with them?
- Have you ever thought about what happens to your old gadgets once you throw them away?
- Do you currently practice any recycling habits at home or in your workplace?

Do

- Introduce the concept of waste management and its importance.
- Outline the session's objectives.

Elaborate

Understanding E-Waste

• Define e-waste and discuss common electronic products contributing to it.

Concept of Waste Management

• Explain the overall concept of waste management, including the 3 R's (Reduce, Reuse, Re-cycle).

Recycling Process of E-Waste

• Detail the process of recycling e-waste and the environmental benefits.

Demonstrate

Demonstrate the disassembly of a simple electronic device to highlight recyclable compo-nents. Discuss the importance of responsible disposal.

Activity

1. **Activity name:** E-Waste Sorting
2. **Objective:** Sort various e-waste items into categories (recyclable, non-recyclable).
3. **Type of Activity:** Group
4. **Resources:** Samples of e-waste, recycling bins.
5. **Time Duration:** 30 minutes
6. **Instructions:**
   • Groups sort provided e-waste items, discussing reasons for their choices.
7. **Outcome:** Improved understanding of e-waste categories and recycling possibilities.

Notes for Facilitation

• Encourage participants to share personal experiences or challenges related to waste manage-ment.
• Emphasize the importance of individual responsibility in waste reduction.
• Provide information on local e-waste recycling facilities or programs.
• Discuss the impact of improper e-waste disposal on the environment.
• Encourage participants to share any sustainable waste management practices they are aware of.

Unit 5.6: Organizations' Focus on the Greening of Jobs

Unit Objectives ⊚

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

1. Understand the concept of ESG
2. Explain the different factors of ESG

Resources to be Used ⚙

Visual aids or slides on e-waste, Samples of e-waste products, Information on local waste man-agement facilities, Recycling bins or containers.

Say 💬

- Today, we're diving into a crucial topic – 'Waste Management.' It's not just about cleaning up; it's about understanding what we discard and how it impacts the environment.

- Our objective today is to explore the world of waste management, with a special focus on e-waste. By the end, you'll understand what e-waste is, the concept of waste management, and the recycling process, contributing to a cleaner, greener planet.

- The way we manage waste, especially electronic waste, has a direct impact on our environ-ment. Understanding this process empowers us to make informed choices and actively partici-pate in creating a sustainable future.

Ask 🗨

- Can you name some electronic devices you've discarded recently, and what did you do with them?
- Have you ever thought about what happens to your old gadgets once you throw them away?
- Do you currently practice any recycling habits at home or in your workplace?

Do ✓

- Introduce the concept of waste management and its importance.
- Outline the session's objectives.

Elaborate

Understanding E-Waste

- Define e-waste and discuss common electronic products contributing to it.

Concept of Waste Management

- Explain the overall concept of waste management, including the 3 R's (Reduce, Reuse, Re-cycle).

Recycling Process of E-Waste

- Detail the process of recycling e-waste and the environmental benefits.

Demonstrate

Demonstrate the disassembly of a simple electronic device to highlight recyclable compo-nents. Discuss the importance of responsible disposal.

Activity

1. **Activity name:** E-Waste Sorting
2. **Objective:** Sort various e-waste items into categories (recyclable, non-recyclable).
3. **Type of Activity:** Group
4. **Resources:** Samples of e-waste, recycling bins.
5. **Time Duration:** 30 minutes
6. **Instructions:**
   - Groups sort provided e-waste items, discussing reasons for their choices.
7. **Outcome:** Improved understanding of e-waste categories and recycling possibilities.

Notes for Facilitation

- Encourage participants to share personal experiences or challenges related to waste manage-ment.
- Emphasize the importance of individual responsibility in waste reduction.
- Provide information on local e-waste recycling facilities or programs.
- Discuss the impact of improper e-waste disposal on the environment.
- Encourage participants to share any sustainable waste management practices they are aware of.

Answers to Exercises for PHB

Multiple Choice Questions

1. a. First Aid
2. a. Cold
3. a. Antiseptic
4. a. Chemical hazards
5. a. Cardio Pulmonary Resuscitation

Answer the following:

1. Refer - UNIT 5.1 Hazards and Accidents in the Store and Safe Practices
   Topic – Importance of Health and Safety
2. Refer - UNIT 5.1 Hazards and Accidents in the Store and Safe Practices
   Topic – Effects of Poor Maintenance
3. Refer - UNIT 5.1 Hazards and Accidents in the Store and Safe Practices
   Topic – Importance of Health and Safety
4. Refer - UNIT 5.2 Safety Practices
   Topic – Securing Customer Records
5. Refer - UNIT 5.2 Safety Practices
   Topic – Securing Customer Records
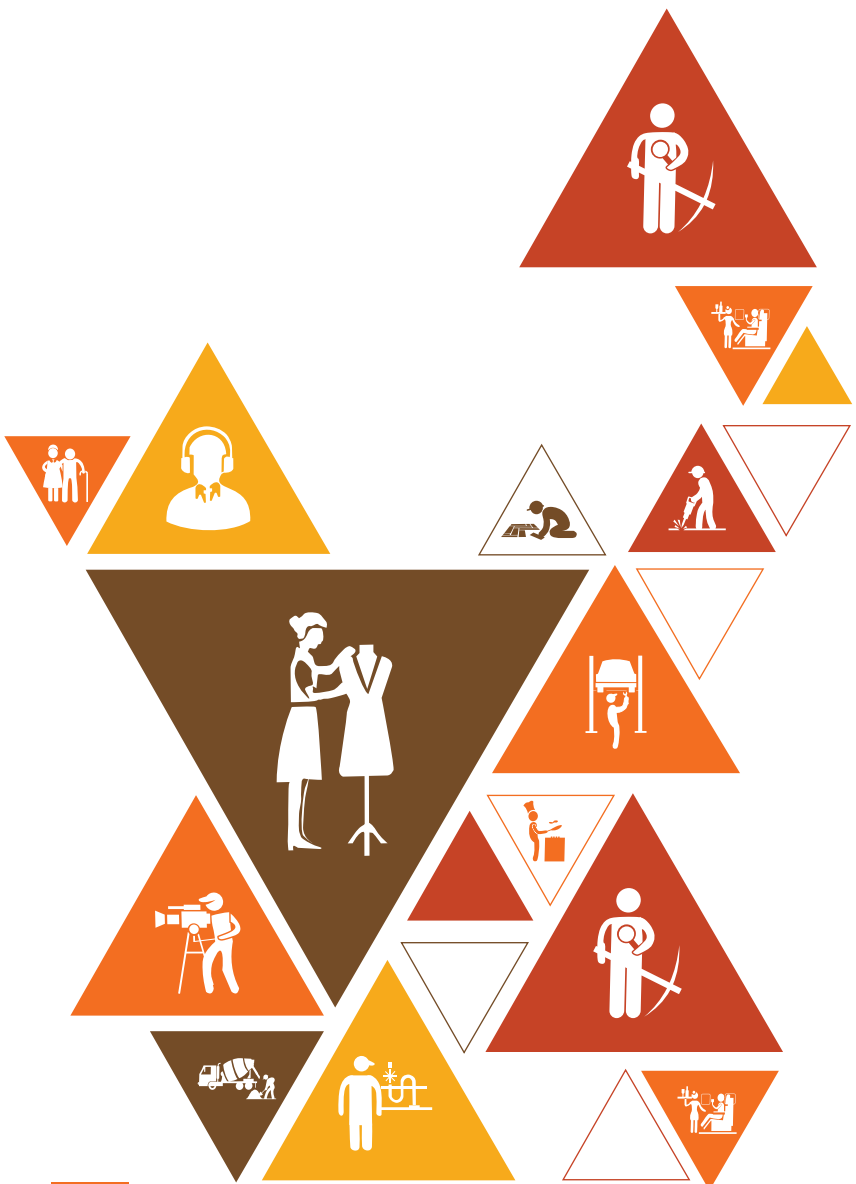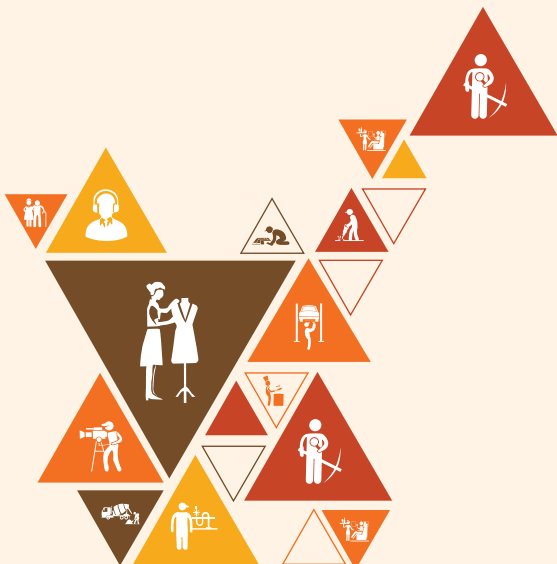
6. Employability Skills

Scan the QR codes or click on the link for the e-books

https://www.skillindiadigital.gov.in/content/list

Employability Skills

7. 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:	In-Building Wireless Solution (IBS) Technician		
Qualification Pack Name & Ref. ID	In-Building Wireless Solution (IBS) Technician, TEL/Q6701, V1.0		
Version No.	1.0	**Version Update Date**	Not Applicable
Pre-requisites to Training (if any)	Not Applicable		
Training Outcomes	**By the end of this program, the participants will be able to:** 1. Prepare for deploying In-building Wireless Solutions 2. Install Wireless Network Solutions at the site 3. Maintain IBS networks at site 4. Organise Work and Resources as per Health and Safety Standards 5. Employability Skills (60hrs)		

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
1.	Introduction to the latest trends in cellular and wireless networks, role and responsibilities of an In-Building Wireless Solution (IBS) Technician	Latest Trends in the Telecom industry	• Discuss the latest trends in the Telecom industry with the introduction of 5G • Discuss how the Indian market is going to perform in the next ten years with regard to telecom industry • Discuss how the Indian telecom industry affect the Indian economy	Bridge Module	Classroom lecture / Power-Point Presentation / Question & Answer / Group Discussion	Whiteboard, Marker, Duster, Projector, Laptop, PowerPoint Presentation	8 Theory (03:00) Practical (05:00)
		Importance of Safety Precautions at Work	• List the safety precautions to be taken while at work • Discuss the importance of using the safety equipment while at work				8 Theory (03:00) Practical (05:00)
		Role of the In-building Wireless Solution Technician	• Explain the Role and Responsibilities of the In-building Wireless Solution Technician				7 Theory (02:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		Skills Required of In-building Wireless Solution Technician	• Explain the professional skills required to move up in the career ladder				7 Theory (02:00) Practical (05:00)
2.	Prepare the Site for Deploying Wireless Solutions	Wireless Network Site Survey and Planning	• Identify the need for uninterrupted wireless connectivity in high-rise buildings and assess its impact on quality of service. • Obtain clearance from competent authorities for conducting site surveys by following organisational and regulatory protocols. • Handle survey tools securely and efficiently to prevent damage and ensure accurate data collection. • Assess the site to determine wireless coverage, data rates, network capacity, and quality of service. • Identify and select appropriate locations for RF coverage holes, interference areas, and dead spots. • Select suitable survey methods—predictive, passive, or active—based on site conditions and available resources. • Input collected data into survey software for analysis in accordance with organisational standards. • Record survey results with details such as signal spectrum, cable paths, mounting locations, installation activities, and hardware requirements.	TEL/N6701 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, KU1, KU2, KU4, KU5, KU6, KU9, KU10, KU16, KU17	Classroom lecture / Power-Point Presentation / Question & Answer / Group Discussion	Training kit (Trainer guide, Presentations), Whiteboard, Marker, Projector, Laptop, Presentation, Participant Handbook, Spectrum analyzer, signal strength meter, Wi-fi scanners, measuring tape and laser distance meter, digital floor plans, power over ethernet tester, wireless access points, camera, laptop or mobile, power outlet tester, battery pack, PPE kits, Site survey software, internet connectivity, operation manual	8 Theory (03:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			• Prepare a comprehensive site survey report based on software recommendations and best practices. • Explain the fundamental concepts of 5G and legacy mobile communication networks, ranging from 2G to 5G. • Describe the importance of continuous wireless connectivity in high-rise buildings. • Differentiate between predictive, active, and passive survey methods, highlighting their use cases. • Illustrate the impact of poor network design on operational efficiency and quality of service. • Interpret site survey results and floor plans to recommend effective network solutions.				
		Site Readiness and Network Deployment	• Study floor plans meticulously to determine optimal device placement. • Select appropriate types of access points, such as lightweight or autonomous, based on frequency bands (2.4 GHz or 5 GHz). • Assess Ethernet cable requirements and determine the number of access points required for optimal coverage. • Gather resources efficiently for commissioning the network to ensure seamless execution.	TEL/N6701 PC10, PC11, PC12, PC13, PC14, KU3, KU7, KU8, KU11, KU17, KU18			8 Theory (03:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			• Procure necessary certificates and approvals from competent authorities before installation. • Determine space requirements considering future network expansion needs. • Identify the correct tools and techniques required for an efficient network layout. • Compare the features of different access points to select the most suitable for a given scenario. • Evaluate various floor plan structures to facilitate proper device placement and coverage. • Interpret regulatory guidelines and policies related to wireless network deployment and environmental considerations.				
		Wireless Solution Design and Implementation	• Measure the space required for different network devices with precision. • Identify the most suitable signal source based on network capacity and coverage requirements. • Select the appropriate in-building wireless solution according to the available area, client requirements, and budget constraints. • Create a detailed installation design for each component within the allocated space.	TEL/N6701 PC15, PC16, PC17, PC18, KU12, KU13, KU14, KU15			7 Theory (02:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			• Distinguish between various networking types, including Bidirectional Amplifier Systems, Microcell Systems, and Distributed Antenna Systems. • Describe the functioning of amplifiers in both receive and transmit modes. • Analyse the suitability of signal sources such as off-air antennas, BTS, and microcells based on coverage requirements. • Measure and interpret uplink and downlink signal strength using appropriate units.				
		Compliance and Quality Assurance in Wireless Networks	• Analyse the potential consequences of a poorly designed network infrastructure on organisational operations and service quality. • Interpret government and DoT policies related to 5G network usage and e-waste management. • Ensure compliance with regulatory standards and best practices while implementing wireless solutions. • Develop strategies to maintain high service quality by adhering to network design principles and guidelines. • Assess the environmental and operational implications of network infrastructure choices in high-rise buildings.	TEL/N6701 KU16, KU18			7 Theory (02:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
3.	Install Wireless Network Solutions at Site	Site Preparation for Installation	• Interpret the installation design layout to set up the distributed antenna system effectively. • Verify the suitable distribution technology in the installation site area based on the given conditions. • Ensure the availability and working condition of the installation tool kit. • Inspect the installation site to confirm it is free of obstructions. • Evaluate the compatibility and usability of the hardware received for commissioning. • Demonstrate the correct usage of PPE kits before commencing the installation process. • Arrange UPS backup to ensure uninterrupted device functionality during power failure. • Describe the floor plan and DAS design at the site to facilitate efficient installation. • Differentiate in-building wireless solutions based on site area and bandwidth requirements. • Identify the importance of wearing PPE kits for safety compliance during installation.	TEL/N6702 PC1, PC2, PC3, PC4, PC5, PC6, PC7, KU1, KU2, KU12, KU19, KU21	Classroom lecture / Power-Point Presentation / Question & Answer / Group Discussion	Training kit (Trainer guide, Presentations), Whiteboard, Marker, Projector, Laptop, Presentation, Participant Handbook, Spectrum analyzer, signal strength meter, Wi-fi scanners, measuring tape and laser distance meter, digital floor plans, power over ethernet tester, wireless access points, camera, laptop or mobile, power outlet tester, battery Backup, Donor Antenna, Bidirectional amplifier, remote units, co-axial cables, fiber optic cables, antenna, splitters, couplers, combiners, signal source,	8 Theory (02:00) Practical (06:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			• Explain government policies related to wireless network installations. • Comply with health, safety, environmental, and regulatory frameworks during installation activities.			DAS System, HEU, co-axial connectors, adapters, monitoring and control systems, power meter, spectrum analyzer, Optical time domain reflectometer, PPE kits, Site survey software, internet connectivity, operation manual	
		Cellular Signal Booster Installation	• Install the donor antenna at the appropriate building location to receive cellular signals effectively. • Connect the bidirectional amplifier (BDA) to the signal source using coaxial cables. • Position couplers to split signals accurately in the designated building area. • Utilize splitters to distribute signals efficiently across the building. • Apply attenuators to balance and adjust signal strength appropriately. • Install terminations to prevent signal degradation and interference. • Test and validate signal strength and quality post-installation. • Compare Passive DAS and Active DAS to determine the best implementation approach. • Apply the principles of wave propagation in signal booster installations.	TEL/N6702 PC8, PC9, PC10, PC11, PC12, PC13, PC14, KU3, KU4, KU5, KU6, KU7, KU8			8 Theory (02:00) Practical (06:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			• Illustrate the functions of NodeB, eNodeB, and gNB in cellular networks. • Explain the use of splitters, couplers, co-axial cables, and attenuators in signal distribution.				
		Distributed Antenna System In-stallation	• Install the DAS Headend Unit to receive wireless signals and distribute them efficiently. • Connect the HEU to the base station using fiber optic or coaxial cables. • Strategically place antennas inside the building to ensure optimal signal coverage. • Connect antennas to remote units via coaxial cables to amplify signals. • Implement power supply units to provide adequate power to Active DAS components. • Deploy system controller software to manage and monitor the DAS system. • Explain the functions and components of the Headend Unit and Remote Units. • Identify various installation and testing tools required for DAS setup.	TEL/N6702 PC15, PC16, PC17, PC18, PC19, PC20, KU9, KU10, KU11			8 Theory (02:00) Practical (06:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		Microcell Deployment	• Determine the number of microcells required based on coverage needs. • Identify the best locations for installing microcells to maximize coverage. • Mount small cells securely using appropriate installation techniques. • Provide power connections to microcells for uninterrupted operation. • Integrate microcells into the existing network for seamless coverage. • Configure small cells to align with the existing network infrastructure. • Test and optimize the microcells to ensure efficient operation. • Differentiate between indoor and outdoor antenna systems for various coverage scenarios. • Describe in-building wireless solutions based on site requirements.	TEL/N6702 PC21, PC22, PC23, PC24, PC25, PC26, PC27, KU2, KU5			8 Theory (02:00) Practical (06:00)
		Device Configuration	• Verify that installed devices are powered on and fully operational. • Install the required configuration software on laptops/desktops. • Adjust the central hub settings to optimize signal frequency and power levels. • Configure remote units to ensure efficient signal amplification. • Optimize antenna settings to achieve maximum coverage.	TEL/N6702 PC28, PC29, PC30, PC31, PC32, PC33, PC34, KU16, KU17			8 Theory (02:00) Practical (06:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			• Fine-tune amplifiers to enhance signal transmission. • Configure cables to minimize signal loss and interference. • Apply various software programs for wireless connectivity testing. • Describe different data transmission protocols used in network configurations.				
		Connectivity Testing	• Ensure all devices are connected to the power source and cables are secured. • Use cable testers to verify cable functionality. • Measure signal reflection and loss using TDR and OTDR. • Assess power levels at various DAS system points. • Conduct sweep tests and PIM analysis to validate signal quality. • Utilize a spectrum analyzer to measure noise levels within the system. • Confirm the latest software versions are installed on all devices. • Review the configuration settings to ensure system alignment. • Verify proper communication between HEU, remote units, and system components. • Perform load and stress testing to evaluate system performance. • Explain the purpose of Sweep and PIM testing for quality assurance.	TEL/N6702 PC35, PC36, PC37, PC38, PC39, PC40, PC41, PC42, PC43, PC44, PC45, KU13, KU14, KU15			8 Theory (02:00) Practical (06:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		Documen-tation and Support	• Maintain comprehensive user manuals and technical documentation for the DAS system. • Prepare documentation to support future system expansion. • Record and update asset details with their nomenclature. • Coordinate with DAS vendors for technical support. • Train staff members on DAS system maintenance procedures. • Maintain detailed records of all installation, maintenance, and upgrade activities. • Schedule maintenance tasks on a daily, weekly, and monthly basis. • Apply appropriate documentation techniques to troubleshoot DAS issues.	TEL/N6702 PC46, PC47, PC48, PC49, PC50, PC51, PC52, KU18, KU22			8 Theory (02:00) Practical (06:00)
		Safety Measures and Com-pliance	• Demonstrate compliance with health, safety, and environmental regulations. • Explain the risks of working with high radio frequencies and electromagnetic waves. • Interpret government policies regarding wireless network installations. • Implement best practices for workplace safety and hazard prevention.	TEL/N6702 KU12, KU19, KU20, KU21			8 Theory (02:00) Practical (06:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		Wireless Network Fundamentals	• Compare the features and applications of Passive DAS and Active DAS. • Explain the concept of wave propagation in wireless networks. • Describe the functions of NodeB, eNodeB, and gNB in network infrastructure. • Illustrate the components and functions of indoor and outdoor antenna systems.	TEL/N6702 KU3, KU4, KU5, KU6, KU7, KU8			7 Theory (01:00) Practical (06:00)
		Signal Distribution Techniques	• Apply the use of splitters, couplers, attenuators, and terminations in signal distribution. • Identify the components and functionalities of Remote Units. • Describe the working of the DAS Headend Unit.	TEL/N6702 KU6, KU9, KU10			7 Theory (01:00) Practical (06:00)
		Testing Tools and Techniques	• Utilize media testers, spectrum analyzers, and power meters for connectivity testing. • Apply TDR and OTDR testing for signal verification. • Conduct Sweep and PIM testing to maintain signal quality.	TEL/N6702 KU11, KU13, KU14, KU15			7 Theory (01:00) Practical (06:00)
		Network Protocols and Software Usage	• Apply UDP, TCP, FTP, and ICMP protocols in wireless network communication. • Utilize various software applications for configuring and monitoring network performance.	TEL/N6702 KU16, KU17			5 Theory (01:00) Practical (04:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
4.	Maintain IBS Networks at the site	Preventive Maintenance Planning	• Plan and schedule preventive maintenance activities at daily, weekly, and monthly intervals. • Notify network operation teams and supervisors regarding planned maintenance activities. • Clean and dust system components periodically to maintain optimal performance. • Assess and regulate control room temperature to ensure the proper functioning of DAS devices. • Inspect power cables and battery backup systems to verify their efficiency and longevity. • Describe the preventive maintenance process in detail. • Follow organizational guidelines and procedures to carry out scheduled maintenance activities effectively.	TEL/N6703 PC1, PC2, PC5, PC6, PC7, KU1, KU2	Classroom lecture / Power-Point Presentation / Question & Answer / Group Discussion	Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, monitoring and control systems, power meter, spectrum analyzer, Optical time domain reflectometer, PPE kits, cloth for wiping the devices, cleaner, sanitizer, internet connectivity, operation manual	8 Theory (02:00) Practical (06:00)
		System Inspection and Testing	• Examine system components such as antennas, cables, and amplifiers for signs of wear and damage. • Evaluate system performance for any degradation or performance issues. • Ensure alarms and alerts are properly configured and functioning correctly.	TEL/N6703 PC3, PC4, PC9, KU3, KU6, KU8			8 Theory (02:00) Practical (06:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			• Identify and document damage or breakage in system components following organizational processes. • Explain the significance of testing alarm systems regularly to ensure timely notifications. • Operate various testing equipment efficiently during site inspections.				
		Software and Firmware Maintenance	• Update firmware and software of system components whenever necessary. • Apply appropriate patches and upgrades as per system requirements. • Recognize the importance of keeping system software and firmware up to date.	TEL/N6703 PC8, KU7			8 Theory (01:00) Practical (07:00)
		Troubleshooting and Fault Resolution	• Identify faulty devices by analysing error logs and using network diagnostic tools. • Isolate malfunctioning devices to prevent further network disruptions. • Conduct tests to determine the root cause of device failures. • Repair or replace faulty devices according to the nature of the issue. • Reconnect the device post-repair or replacement and ensure proper functionality.	TEL/N6703 PC10, PC11, PC12, PC13, PC14, PC15, PC16, PC17, KU4, KU5			8 Theory (01:00) Practical (07:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			• Monitor the network to confirm the resolution of the problem. • Document the repair process, including causes, actions taken, and parts replaced. • Implement organizational procedures for repairing or replacing damaged devices. • Apply troubleshooting techniques specific to different types of devices.				
		Customer Interaction and Communication	• Inform customers and relevant authorities about planned maintenance activities. • Provide advance warnings to customers regarding potential disruptions. • Share maintenance details and performed actions with customers. • Advise customers on any detected deterioration in system performance. • Collect customer feedback and suggestions for service improvement. • Maintain a professional and courteous relationship with customers. • Follow appropriate conduct when interacting with customers according to organizational policies.	TEL/N6703 PC18, PC19, PC20, PC21, PC22, PC24, KU11			7 Theory (01:00) Practical (06:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
		Documen-tation and Reporting	• Record maintenance activities, including tasks performed and observations made. • Prepare detailed reports outlining causes of faults, repair steps, and part replacements. • Follow the process for documenting any damages or breakages detected during maintenance.	TEL/N6703 PC17, PC23, KU3			7 Theory (01:00) Practical (06:00)
		Safety and Compliance	• Utilize PPE kits appropriately while performing maintenance tasks. • Ensure the safe handling of tools and equipment during maintenance activities. • Dispose of waste materials safely after installation and maintenance work.	TEL/N6703 KU9, KU10			7 Theory (01:00) Practical (06:00)
		Environ-mental and Operational Awareness	• Monitor the control room environment to maintain optimal operating conditions. • Verify the performance of power cables and backup systems periodically. • Emphasize the critical role of alarm systems in network safety. • Demonstrate the ability to operate testing instruments effectively on-site.	TEL/N6703 PC6, PC7, KU6, KU8			7 Theory (01:00) Practical (06:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
5.	Organize Work and Resources as per Health and Safety Standards	Workplace Efficiency and Accountability	• Demonstrate the ability to maintain a clean and organised workspace to enhance productivity and efficiency. • Perform assigned roles and responsibilities with accountability to ensure effective task execution. • Document completed tasks accurately within specified timelines to track progress and compliance. • Implement work schedules effectively to achieve timely completion of tasks and organisational goals. • Identify and validate problems related to assigned tasks using logical reasoning and critical thinking. • Analyse work-related issues accurately and propose appropriate solutions to improve efficiency. • Explain key performance indicators and their significance in achieving quality outcomes. • Apply feedback mechanisms and reporting formats to monitor and enhance work performance. • Relate task timelines and goals to their relevance in achieving organisational objectives.	TEL/N9101 PC1, PC2, PC3, PC4, PC5, PC6, KU2, KU3, KU4, KU5, KU6, KU7	Classroom lecture / PowerPoint Presentation / Question & Answer / Group Discussion	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Relevant stationery, First Aid Kit and Equipment used in Medical Emergencies	8 Theory (03:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			• Evaluate the importance of delivering quality and timely services or products. • Interpret escalation procedures and their critical role in handling workplace challenges. • Apply cost and time management techniques to optimise workflow and resource utilisation.				
		Health, Safety, and Environ-mental Compliance	• Demonstrate adherence to health, safety, and security protocols as per organisational policies. • Identify potential hazards such as water spills and report them to the appropriate authority. • Report breaches in health, safety, and security policies to designated personnel promptly. • Use appropriate personal protective equipment (PPE) such as gloves, goggles, and masks to ensure safety. • Prevent damage to components by adhering to Electrostatic Discharge (ESD) safety guidelines. • Respond effectively to workplace hazards and emergencies by following standard procedures. • Participate actively in safety training programmes and fire drills to enhance preparedness.	TEL/N9101 PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC22, KU8, KU9, KU10, KU11, KU12, KU13, KU14, KU15, KU16			8 Theory (03:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			• Report hazards beyond personal control to relevant authorities while ensuring others' safety. • Maintain correct posture during prolonged sitting or standing to prevent physical strain. • Handle heavy and hazardous materials with care while following ergonomic guidelines. • Apply regular sanitisation practices to workstations and equipment for hygiene maintenance. • Demonstrate appropriate personal hygiene practices to prevent communicable diseases. • Follow travel safety precautions such as social distancing and sanitisation measures. • Report hygiene and sanitation issues to relevant authorities for corrective actions. • Implement recommended personal hygiene measures to prevent infections and workplace contamination.				
		Resource Conservation and Equipment Maintenance	• Optimise material usage, including water, in daily tasks to ensure minimal wastage. • Utilise resources such as water and electricity responsibly to support sustainability goals. • Perform routine cleaning of tools, machines, and equipment to maintain operational efficiency.	TEL/N9101 PC23, PC24, PC25, PC26, PC27, PC28, PC29, KU17, KU18			7 Theory (02:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			• Minimise energy consumption by adopting best practices in various work processes. • Conduct regular inspections of equipment to ensure functionality and rectify minor faults. • Report equipment malfunctions and maintenance lapses for timely resolution. • Operate electrical equipment and appliances correctly to prevent damage and energy wastage. • Apply efficient resource management techniques to reduce operational costs. • Identify common electrical issues and implement conservation practices effectively.				
		Waste Management and Sustainable Practices	• Identify recyclable, non-recyclable, and hazardous waste accurately for proper disposal. • Deposit recyclable and reusable materials at designated locations to support sustainability. • Dispose of hazardous and non-recyclable waste following recommended organisational procedures. • Classify waste into categories such as dry, wet, and single-use plastics for efficient waste segregation.	TEL/N9101 PC30, PC31, PC32, KU19, KU20, KU21, KU22			7 Theory (02:00) Practical (05:00)

SL	Module Name	Session name	Session Objectives	NOS	Methodology	Training Tools/Aids	Duration (hours)
			• Implement organisational procedures to minimise waste and enhance recycling efforts. • Apply effective waste disposal methods in compliance with environmental regulations. • Identify sources of pollution within the workplace and take measures to minimise their impact.				
Total Duration							Theory: 60:00 Practical: 180:00
Employability Skills (DGT/VSQ/N0102) **(https://www.skillindiadigital.gov.in/content/list)**							60:00
OJT							120:00
Total Duration							PR + TH + OJT + ES= 420 : 00

Annexure II

Assessment Criteria

CRITERIA FOR ASSESSMENT OF TRAINEES

Assessment Criteria for In-Building Wireless Solution (IBS) Technician	
Job Role	In-Building Wireless Solution (IBS) Technician
Qualification Pack	TEL/Q6701, V1.0
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 50% 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/N6703: Maintain IBS Networks at the site	Preventive maintenance of installed components	11	20	9
	PC1. • perform scheduled maintenance and cleaning of devices • schedule: daily, weekly, monthly	1	2	1
	PC2. inform the network operation team and supervisors about the maintenance planned for the day	1	2	1
	PC3. • inspect the system components for wear and tear, corrosion or damage • components: antennas, cables, amplifiers and other signal processing elements	1	4	1
	PC4. test the system performance for system degradation or other performance issues	2	2	1
	PC5. clean and dust the system components periodically	1	2	1
	PC6. check the temperature of the control room to ensure DAS devices are not getting hot	1	2	1
	PC7. check power cables and battery backup performance	1	2	1
	PC8. update firmware and software for all system components whenever required	1	2	1
	PC9. verify alarms and alerts are configured properly and are functioning	2	2	1
	Troubleshoot and repair faulty devices	12	16	9

	PC10. identify the faulty device by checking the error logs or by using network diagnostic tools	1	2	1
	PC11. isolate the device to prevent it from affecting the rest of the devices in the network	1	1	1
	PC12. test the device to identify the cause of the problem	2	3	2
	PC13. repair or replace the device depending on the nature of the problem	1	2	1
	PC14. reconnect the device after repair/replacing the damaged parts	2	2	1
	PC15. verify the working of the device that is reconnected	1	2	1
	PC16. Monitor the network to check the problem is resolved	2	2	1
	PC17. document the repair and include the cause of the problem, steps taken to repair it, and any parts that were replaced, or any software updated	2	2	1
	Liaise with customers during service visits at the site	7	9	7
	PC18. inform customers and other authorities of the planned maintenance activities	1	1	1
	PC19. provide customers with sufficient warning of any action than can disrupt their work	1	1	1
	PC20. provide customers with details of maintenance carried out	1	2	1
	PC21. advise customers of any deterioration in system performance	0.5	1	1
	PC22. take feedback and any suggestions from customers for improvement	0.5	1	-
	PC23. document the details of the maintenance work	1	2	1
	PC24. maintain a positive and professional relationship with customers at all times	2	1	2
	NOS Total	**30**	**45**	**25**
TEL/N6702: Install Wireless Network Solutions at Site	Prepare for installation at the site	4	8	4
	PC1. interpret the installation design layout for setting up the distributed antenna system	1	1	-
	PC2. • verify the suitable distribution technology in the area of the installation site • technology: Cellular Signal Boosters, Active DAS, microcells	1	2	1
	PC3. verify the installation tool kit is available and is in a working condition	-	1	1
	PC4. check the installation site is free of any obstruction	0.5	1	-
	PC5. check the compatibility and usability of the hardware received for commissioning	0.5	1	1
	PC6. wear the PPE kit before the installation process	1	1	0.5
	PC7. arrange UPS backup to the devices in case of power failure	-	1	0.5
	Install cellular signal boosters at the site	6	7	3
	PC8. install the donor antenna at the top of the building at the right direction to receive cellular signals (different antenna for different carriers)	0.5	1	1
	PC9. connect bidirectional amplifier (BDA) to signal source via co-axial cables to receive and amplify signals	1	1	-

PC10. Install the couplers at the designated area in the building to receive signal from BDA and split the signals in a specific ratio	1	1	1
PC11. use splitters at the designated area to divide the signals further and distribute to other areas within the building	1	1	-
PC12. use attenuators to adjust the signal strength and balance the signal levels in the system	1	1	0.5
PC13. Install terminations to prevent signal degradation and interference	1	1	0.5
PC14. test the signal strength and quality	0.5	1	-
Install Distributed Antenna Systems at the site	6	8	4
PC15. install DAS Headend Unit (contains amplifiers, filters, combiners and distribution modules) or the central hub which receives wireless signals from the base station (signal source) and distribute them to the Remote Units (contains amplifiers, filters and signal processing components)	1	2	1
PC16. connect the HEU to the base station (signal source) via fiber optic or coaxial cable (could be on a roof top or indoor)	1	2	1
PC17. install the antennas in strategic locations inside the building to receive and transmit signals throughout the building	1	1	1
PC18. connect the antennas to the remote units using a coaxial cable to carry amplified signals	1	1	-
PC19. use the Power Supply units to provide power to the components of the Active DAS system	1	1	-
PC20. install the system controller software to manage and monitor the Active DAS System	1	1	1
Install additional Microcells to the existing network	5	7	3
PC21. determine the number of cells required based on the coverage	1	1	0.5
PC22. identify the location where the microcell needs to be installed	0.5	1	0.5
PC23. mount the small cells on poles or secure them to the structure through bolts or clamps in the identified location	1	1	1
PC24. provide power source to the small cells through a power cable	0.5	1	-
PC25. connect the small cells to the existing network to provide coverage	1	1	1
PC26. configure the small cells to work with existing network with appropriate software	0.5	1	-
PC27. test and optimize to ensure they are providing intended coverage	0.5	1	-
Configure the devices in the network	4	6	2
PC28. verify the installed devices are switched on and operational	0.5	1	-
PC29. Install the device configuration software in the laptop/desktop	0.5	1	1
PC30. configure the central hub for appropriate signal frequency and power levels	1	1	-
PC31. configure the remote units to receive and amplify signals correctly	0.5	1	-
PC32. configure the antennas to provide optimal coverage and excellent signal strength	0.5	1	-
PC33. configure the amplifiers to ensure they are amplifying signals to the desired level	0.5	0.5	0.5
PC34. configure the cables to minimize signal loss and interference	0.5	0.5	0.5
Test the working of the connectivity	3	9	3
PC35. check the devices are plugged to the power source and cables are secured	0.5	0.5	-

	PC36. use cable tester or media tester to check if the cables are working properly or not	0.5	0.5	0.5
	PC37. measure the reflected signal quality or loss of signal using Time Domain Reflectometer (TDR used for copper connections) or Optical Time Domain Reflectometer (OTDR used for optical fiber connections)	0.5	1	0.5
	PC38. use a power meter to measure the power levels at various points in the DAS system	0.5	1	-
	PC39. Conduct the Sweep (frequency sweep, sine sweep) Test and PIM (Passive Intermodulation Distortion) to check the quality of the signal transmitted	-	1	-
	PC40. Use a spectrum analyzer to measure noise levels at various points throughout the building	0.5	0.5	-
	PC41. verify the latest version of the software is installed in all the devices in DAS	-	0.5	0.5
	PC42. check the configuration settings of all devices in DAS system	-	1	-
	PC43. test the communication between the HEU, remote units and other components to ensure they are properly connected and are communicating to each other	0.5	1	0.5
	PC44. perform load testing to ensure the system can handle expected amount of traffic and usage	-	1	0.5
	PC45. perform stress testing to ensure the system can handle unexpected spikes in traffic and usage	-	1	0.5
	Monitor documentation and support	2	5	1
	PC46. maintain user manuals, installation guides and technical specifications for DAS system	-	1	0.5
	PC47. maintain the support document for future expansion of the system by adding more devices	-	0.5	-
	PC48. maintain the asset details with their nomenclature	-	1	0.5
	PC49. work closely with DAS vendor to get onsite, remote or telephonic technical support	-	1	-
	PC50. provide training for staff members responsible for maintaining the DAS system	-	1	-
	PC51. • keep detailed records of all aspects of DAS system for future reference • records: installation, maintenance, upgrade and repairs	1	0.5	-
	PC52. document maintenance schedule (daily, weekly, monthly schedule)	1	-	-
	NOS Total	**30**	**50**	**20**
TEL/N6701: Prepare for deploying In-Building Wireless Solutions	Perform site survey (Predictive, Active and Passive) for implementing the wireless solutions	13	21	11
	PC1. identify the need for uninterrupted wireless connectivity in the high-rise buildings	-	2	1
	PC2. obtain the clearance for site survey from the competent authorities (building owners, admin in charge of the premises)	2	2	-
	PC3. handle the survey tools carefully and securely	-	2	1
	PC4. • assess the site/location to determine these parameters • parameters: wireless coverage, data rates, network capacity, quality of service	2	2	2
	PC5. identify and select the appropriate location of RF (Radio Frequency) coverage holes and interference for installation and dead spots	2	2	1

	PC6. • select the appropriate survey methods as per the site location and available resources • methods: predictive, passive, active	2	2	2
	PC7. input the data collected from the site visit to the survey software for detailed analysis as per organization standards	2	3	1
	PC8. • record results with survey details • details: signal spectrum, cable paths, mounting locations, the list of activities for installation, hardware required, configuration recommendations, licensing information, etc.	3	4	2
	PC9. prepare survey report based on the software recommendations	-	2	1
	Inspect site readiness for installation of network devices	8	12	8
	PC10. study the floor plan for installation of devices	1	2	1
	PC11. • select the type of access points • types: lightweight points, autonomous points (in 2.4 or 5 GHz band)	2	3	2
	PC12. assess the ethernet cable requirement and number of access points	2	3	2
	PC13. gather the resources for commissioning of the network	1	2	1
	PC14. Procure the certificate for installation of the inbuilding wireless solutions from the competent authorities	2	2	2
	Prepare Network System Design	9	12	6
	PC15. measure the space requirement for different devices in the network	2	3	2
	PC16. • Identify the suitable signal source depending on the capacity and coverage • Signal sources: off air antennas (roof top donor antennas), Base Transceiver station (BTS) and micro cells	2	3	2
	PC17. • Select the appropriate inbuilding wireless solution depending on the available area, client requirement and budget • Area: small facility in suburb/rural: Passive DAS (Distributed Antenna System) using Bidirectional Amplifier System (BDA) • Area:5000-15000 sq ft: micro cells • Area: 10,00,000-50,00,000 sq ft: Active Distributed Antenna System	3	3	1
	PC18. • create the installation design for each component in the available space • component: access points and distribution unit	2	3	1
	NOS Total	30	45	25
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. analyse problems accurately and communicate different possible solutions to the problem	1	2	-
PC7. comply with organisation's current health, safety, security policies and procedures	1	1	-
PC8. check for water spills in and around the work space 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	-
PC17. 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
PC27. 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**

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)
Module 1: Introduction to the latest trends in cellular and wireless networks, role, and responsibilities of an In-Building Wireless Solution (IBS) Technician	Unit 1.1: 5G Trends and the Role of In-Building Wireless Solutions in Telecom Evolution	1.1.2 Future Trends in the Indian Telecom Industry	19	https://youtu.be/ h3wDrhuFq50	2024 for Indian Telecom Sector || What to Expect
Module 2: Prepare the site for deploying Wireless Solutions	Unit 2.1 Understanding Wireless Connectivity and Site Assessment	2.1.1 Uninterrupted Wireless Connectivity in High-Rise Buildings	60	https://youtu.be/Le1AtE28afs	Framework of wireless connections in buildings
	Unit 2.2: Analyzing Data and Preparing Installation Plans	2.2.5 Ethernet Cable Specifications and Access Point Planning for Building Size and Budget	60	https://youtu.be/ewpq3qxx5Ls	Ethernet Specifications and Access Point Planning

Module No.	Unit No.	Topic Name	Page No. in PHB	Link for QR Code (s)	QR code (s)
	Unit 2.3: Implementing In-Building Wireless Solutions	2.3.1 Authorities Involved in Procuring Certificates for In-Building Wireless Installation	60	https://youtu.be/8AEr-4p5Xyw4	Authorities for WPC Certification
Module 3: Installation of Wireless Network Solutions	Unit 3.1: Preparing for Installation and Ensuring Site Readiness	3.1.5 Identifying the Optimal Location for Microcell Installation	133	https://youtu.be/eS30vm-b6qUg	Microcell zoning in capacity enhancement
	Unit 3.3: Configuring and Testing Wireless Network Components	3.3.1 Steps to Install System Controller Software for Active DAS System Management	133	https://youtu.be/oxnGCDYtP_k	Layout plans for installing a Distributed Antenna System (DAS) software
	Unit 3.4: Maintaining and Documenting the Wireless Network System	3.4.7 Function of Devices in The DAS System	133	https://youtu.be/aRieX-RQAkA	Function of DAS components
Module 4: Maintain Network at site	Unit 4.1: Performing Maintenance and Resolving System Issues	4.1.4 Importance of Planned Scheduled Maintenance and Cleaning of Devices	177	https://youtu.be/4ZXfpfs09g8	Types of device maintenance applicable to power systems

Module No.	Unit No.	Topic Name	Page No. in PHB	Link for QR Code (s)	QR code (s)
	Unit 4.2: Communicating and Documenting Maintenance Activities	4.2.2 Preparing a Maintenance Schedule for System Components	177	https://youtu.be/i5fDW3x-F2uQ	Concept of preparing a maintenance schedule for devices
5. Communication and Interpersonal Skills	UNIT 5.2: Different Types of Health Hazards	5.1.2 First Aid Techniques	232	youtu.be/GrxevjEvk_s	First Aid at Work Place
	UNIT 5.3: Importance of Safe Working Practices	5.3.1 Basic Hygiene Practices	232	https://youtu.be/IsgLivAD-2FE	How to properly wash your hands
	UNIT 5.3: Importance of Safe Working Practices	5.3.3 Safe Workplace Practices	232	https://youtu.be/qzdLm-L4Er9E	How to give CPR to an Adult, a Child or an infant
	UNIT 5.5: time Management	5.5.6 Escalation Matrix	232	youtu.be/ccAZ9nCZSLc	Escalation Matrix PowerPoint Presentation Slides
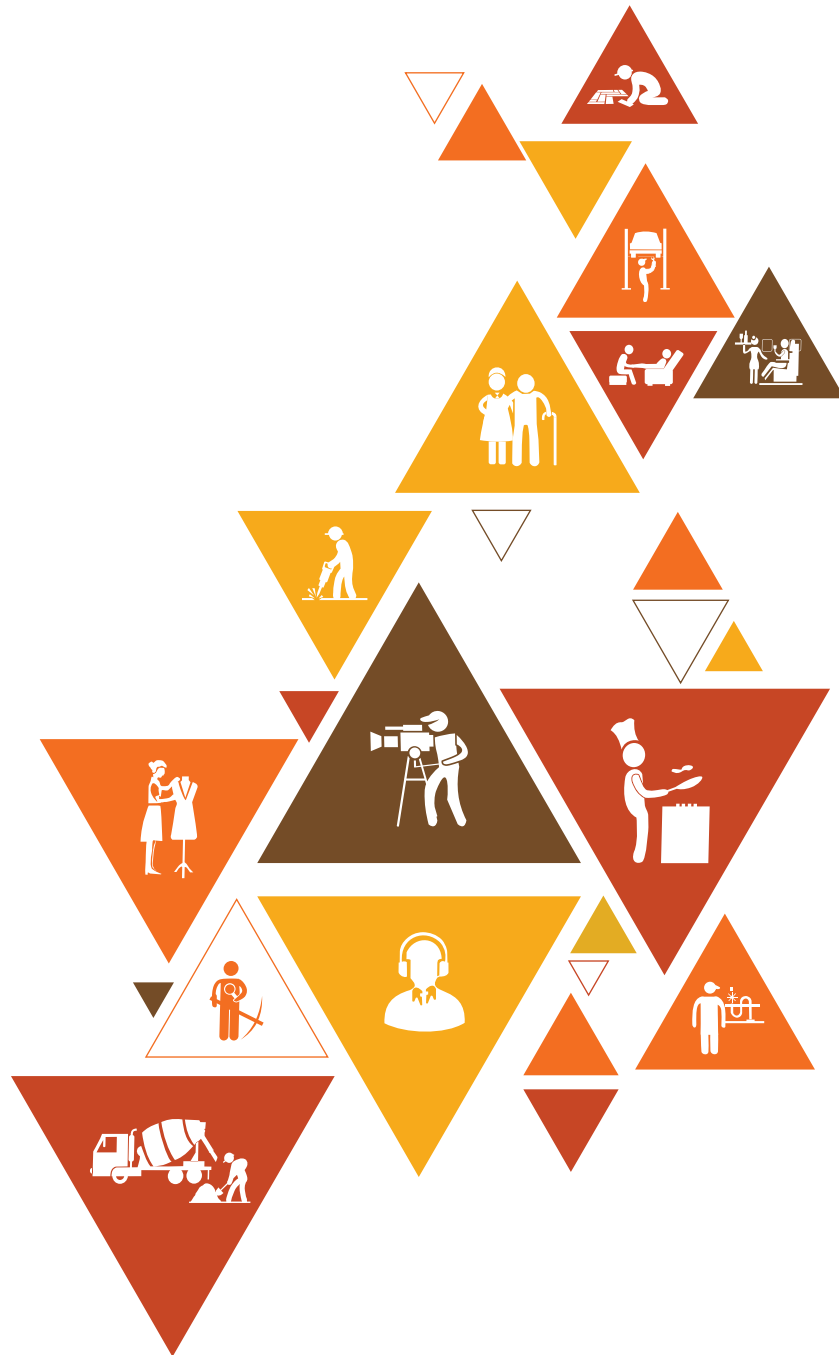
Skill India
कौशल भारत - कुशल भारत

सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

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