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GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
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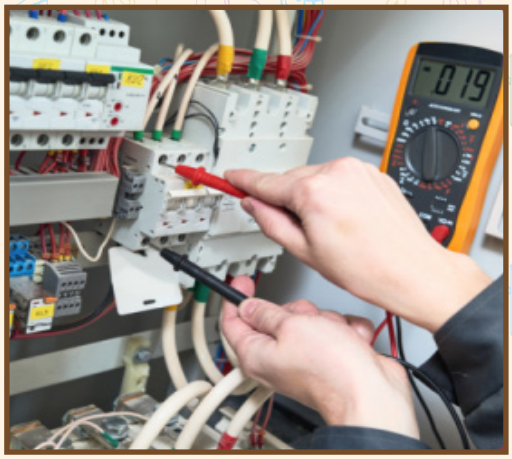
Construction Skill Development Council

Facilitator Guide



Assistant Electrician

Sector
Construction

Sub-Sector
Real Estate and Infrastructure Construction

Occupation
Construction Electrical Works

Refrence ID: **CON/Q0602,** Version **3.0**
NSQF Level: 3

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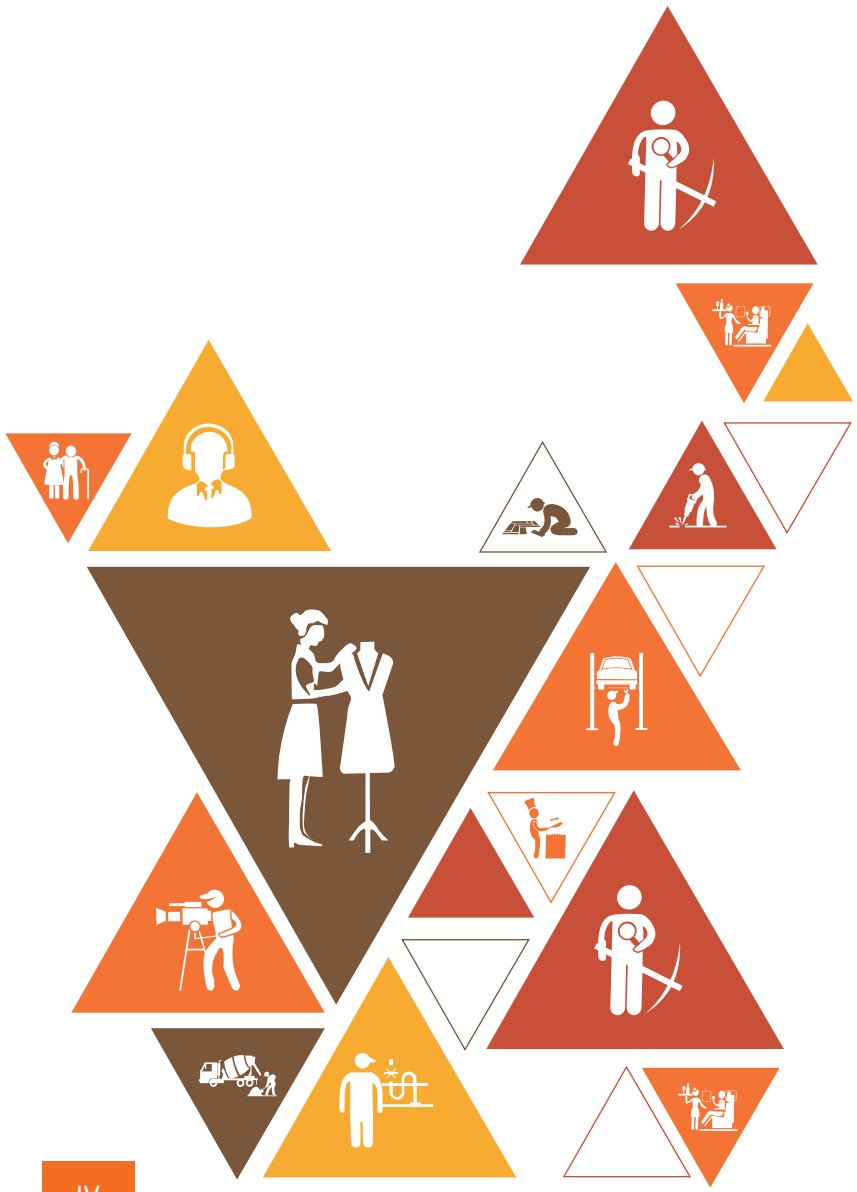
Disclaimer

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

Shri Narendra Modi
Prime Minister of India



Acknowledgement

We are thankful to all organizations and individuals who have helped us in the preparation of this Facilitator Guide. We also wish to extend our gratitude to all those who reviewed the content and provided valuable inputs for improving the quality, coherence, and content presentation of chapters. This Facilitator Guide will lead to successful roll out the skill development initiatives, helping greatly our stakeholders particularly trainees, trainers and assessors etc. We are thankful to our Subject Matter Experts for the content and helping us in the preparation of this Facilitator Guide.

It is expected that this publication would meet the complete requirements of QP/NOS based training delivery. We welcome suggestions from users, industry experts, and other stakeholders for any improvement in the future.

About the Book

The objective of the guide is to provide an approach map for interacting with the trainees undergoing training in this job role. The course aims to provide both theoretical and practical knowledge to the trainees and also to guide them about **Assistant Electrician**. The guide is neither a substitute nor a complete road map, but an aid to help to pass on the knowledge on all the aspects to the trainees in a systematic manner. It is expected that the trainer is fully conversant with all the contents of the guide. The guide is just to indicate how to proceed in covering a topic and includes some additional information that may be necessary for the trainer to develop better comprehension of the following aspects:

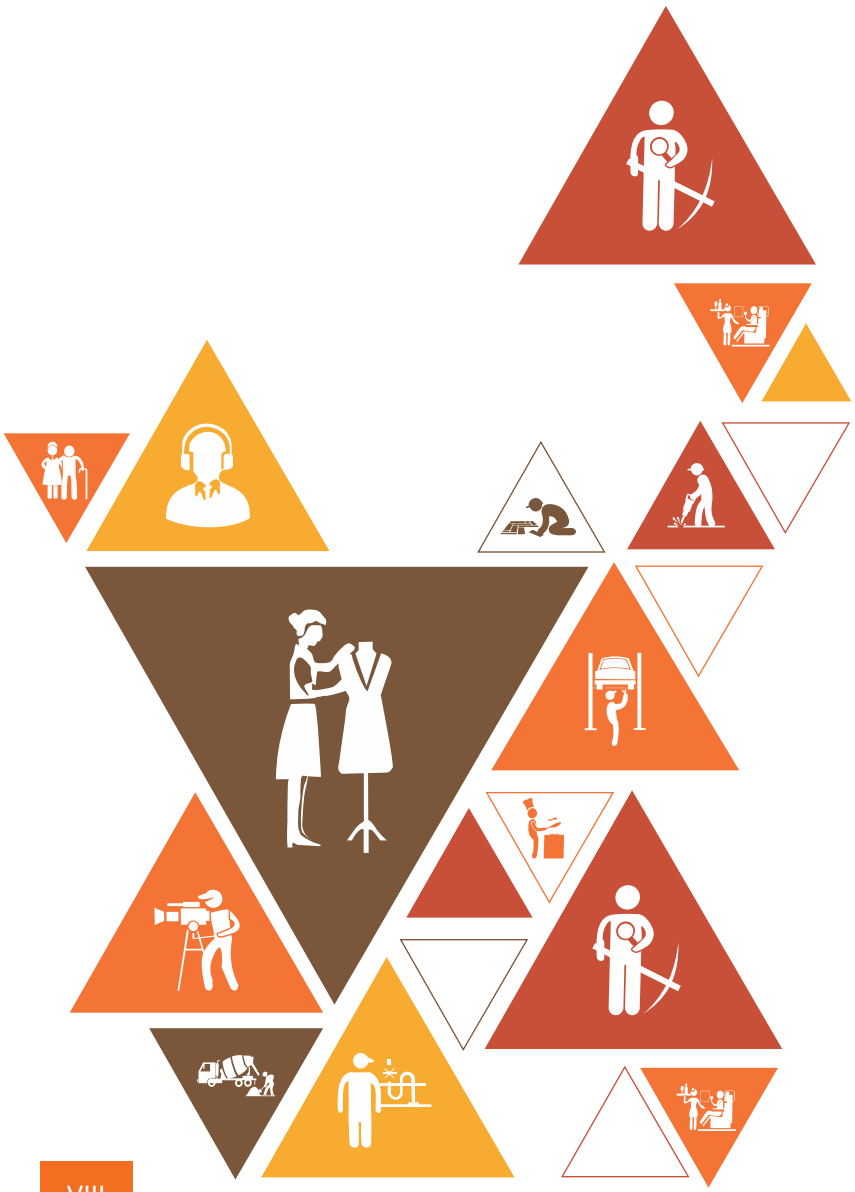
- **Knowledge and Understanding:** Satisfactory operational learning and comprehension to play out the required chore.
- **Performance Criteria:** Pick up the required aptitudes through hands-on preparation and play out the required operations inside the predetermined measures.
- **Professional Skills:** Capacity to settle on operational choices relating to the zone of work.

The job will also include judging comprehension and also help them learn more through hands-on training. But it has to be ensured that these are following the knowledge imparted and time spent on each unit. It is expected that irrespective of the region, knowledge of all aspects will be imparted to trainees.

Symbols Used

Table of Contents

It is recommended that all trainings include the appropriate Employability skills Module. Content for the same can be accessed https://www.skillindiadigital.gov.in/content/list



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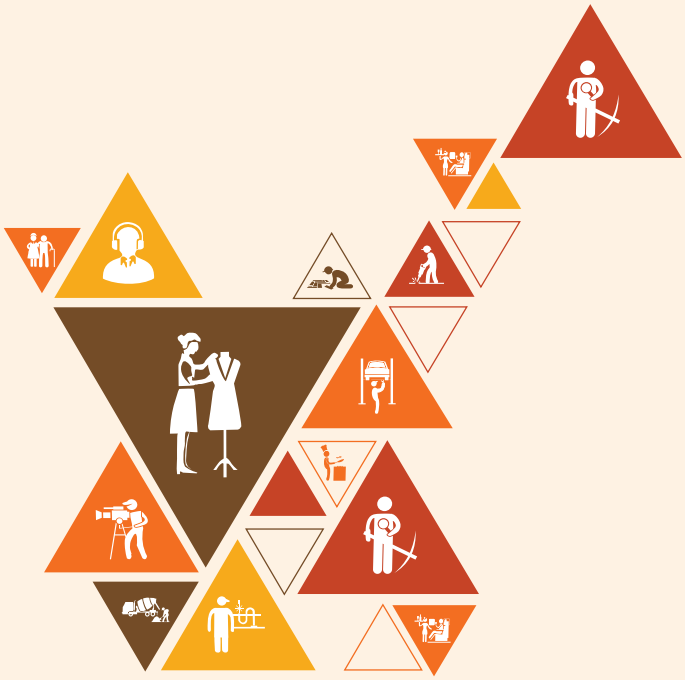
1. Introduction to Assistant Electrician Job Role

Unit 1.1 – Introduction to Construction Industry

Unit 1.2 – Role and Responsibilities of an Assistant Electrician



Key Learning Outcomes

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

1. Describe the role and responsibilities of an **Assistant Electrician**.
2. Define the personal attributes required in occupation of construction electrician works.
3. Explain future possible progression and career options for role of an **Assistant Electrician**

Unit 1.1: Introduction to Construction Industry

Unit Objectives

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

1. Overview of construction industry.

Resources to be used

- **Theory**

  Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.

- **Practical**

  NA

Say

- Let's begin with an ice-breaking session, introduce yourself and ask participants to introduce themselves.

Team Activity

- **Purpose:** This activity aims to familiarise the participants in the group with one another.
- **Tentative Duration:** 15 Mins
- **Procedure:**
  - Ask the participants to pronounce their name with an adjective beginning with the initial letter of their name.
  - Request that they additionally provide a brief introduction of themselves.
- **Expected Outcome:** The outcome of this activity is that the participants will become familiar with each other.

Do

- Explain the construction industry.
- Elaborate types of construction.
- Explain the Construction Project Categories.
- Enlist the Market Segment of Construction Industry.

Notes for facilitation

- Use the **Assistant Electrician** PHB and refer unit 1.1 to explain construction industry.
- Construction Industry:
  - The construction industry involves the planning, designing, building, and maintenance of physical structures such as buildings, infrastructure, and facilities.
  - It encompasses various stages including pre-construction (planning, permits), construction (actual building), and post-construction (maintenance, renovations).
  - It plays a significant role in economic development by creating jobs and contributing to the growth of other industries.
- **Types of Construction:**
  - **Residential Construction:** Involves building homes and housing complexes for individuals and families.
  - **Commercial Construction:** Focuses on non-residential structures like office buildings, retail centers, and hotels.
  - **Industrial Construction:** Involves building factories, warehouses, power plants, and other industrial facilities.
  - **Infrastructure Construction:** Includes building roads, bridges, airports, dams, and other public infrastructure.
  - **Institutional Construction:** Involves constructing schools, hospitals, government buildings, and religious institutions.
  - **Heavy Civil Construction:** Deals with large-scale projects like highways, tunnels, and water treatment plants.
- **Construction Project Categories:**
  - **New Construction:** Building entirely new structures from the ground up.
  - **Renovation/Remodelling:** Modifying or upgrading existing structures to meet changing needs or standards.
  - **Restoration:** Repairing and restoring historical or damaged structures to their original condition.
  - **Maintenance:** Regular upkeep and repairs to ensure structures remain functional and safe.
  - **Demolition:** Safely dismantling and removing structures that are no longer needed.
- **Market Segments of Construction Industry:**
  - **Residential:** Building homes, apartments, and other residential properties.
  - **Commercial:** Constructing office buildings, retail centers, hotels, and entertainment venues.
  - **Industrial:** Developing manufacturing facilities, warehouses, and energy-related infrastructure.
  - **Infrastructure:** Building transportation networks, utilities, and public facilities.
  - **Institutional:** Creating educational institutions, healthcare facilities, government buildings, and cultural centers.
  - **Civil Engineering:** Focusing on large-scale public projects like bridges, roads, and water management systems.

Say

Let us now perform an activity based on various market segments of the construction industry.

Team Activity

- **Purpose:** The objective of this activity is to introduce participants to the different market segments within the construction industry.
- **Resources Required:** Presentation materials (slides or handouts) explaining market segments in the construction industry, internet access or library resources for research, whiteboard or flip chart with markers, printed construction industry reports or data (optional but helpful), worksheets for students to complete during the activity.
- **Tentative Duration:** 60-90 minutes
- **Methods/Procedure:**
    - **Step 1:** Introduction- Begin the activity by discussing the importance of understanding market segments in the construction industry. Explain that market segmentation helps professionals identify specialized opportunities and areas of expertise within the broader field of construction.
    - **Step 2:** Presentation- Deliver a presentation on the different market segments within the construction industry. Include information on residential construction, commercial construction, industrial construction, infrastructure development, and specializations like green building, renovation, and restoration. Use visual aids to make the information more engaging and accessible.
    - **Step 3:** Group Research- Divide the students into small groups and assign each group a specific market segment to focus on. Provide the groups with access to the internet or library resources to conduct research on their assigned market segment. They should explore the scope, current trends, major players, challenges, and potential career opportunities within their segment.
    - **Step 4:** Group Presentation- Each group presents their findings to the rest of the class. Encourage them to use visuals, statistics, and examples to support their presentation. Allow for a short Q&A session after each presentation to clarify doubts and exchange insights.
    - **Step 5:** Reflection and Discussion- Lead a class discussion to debrief the activity. Encourage students to share their thoughts on which market segments they find most appealing and why. Discuss the skills and qualifications required for different market segments and how students can prepare to excel in their chosen area.
- **Expected Outcome:** By the end of this classroom activity, students are expected to:
    - Understand the concept of market segmentation in the construction industry.
    - Identify the various market segments within the construction field, including residential, commercial, industrial, infrastructure, and specialized sectors.
    - Analyze the characteristics, opportunities, and challenges associated with each market segment.

- Gain insights into potential career paths and specialization options within the construction industry.
- Reflect on their interests and skills to make informed decisions about their vocational course and future career goals in construction.

Notes

Unit 1.2: Role and Responsibilities of an Assistant Electrician

Unit Objectives

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

1. Describe the role and responsibilities of an **Assistant Electrician**.
2. Define the personal attributes required in occupation of construction electrician works.
3. Explain future possible progression and career options for role of an **Assistant Electrician**.

Resources to be used

- **Theory**
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
  - NA

Do

- Explain the role and responsibilities of an **Assistant Electrician**.
- Elaborate personal attributes required in occupation of construction electrician works.
- Explain the career options for role of an **Assistant Electrician**.

Notes for facilitation

- Use the **Assistant Electrician** PHB and refer unit 1.2 to explain Role and Responsibilities of an **Assistant Electrician**.
- Role and Responsibilities of an **Assistant Electrician**:
  - An assistant electrician supports the work of a lead electrician or electrical team in various construction projects.
  - They assist in the installation, maintenance, and repair of electrical systems, wiring, fixtures, and equipment.
  - Responsibilities often include preparing work areas, gathering tools and materials, and ensuring safety protocols are followed.
  - They might help run conduit, pull wires, connect outlets, switches, and lighting fixtures under the supervision of a more experienced electrician.

- Troubleshooting and diagnosing electrical issues and assisting in repairs are part of their role.
- They learn on the job, gaining practical experience to develop their skills.

- Personal Attributes for a Construction Electrician:
  - **Technical Aptitude:** A good understanding of electrical principles and hands-on skills with tools and equipment.
  - **Attention to Detail:** Precision is crucial to ensure safety and proper functioning of electrical systems.
  - **Physical Stamina:** Construction work can be physically demanding, requiring the ability to stand, climb, and lift.
  - **Communication:** Effective communication is essential for collaborating with team members and understanding instructions.
  - **Problem-Solving:** Being able to identify and solve electrical issues efficiently and safely.
  - **Safety Focus:** Adhering to safety regulations and protocols to prevent accidents and hazards.
- **Progression and Career Options for an Assistant Electrician:**
  - **Journeyman Electrician:** After gaining experience and completing an apprenticeship, an assistant electrician can become a licensed journeyman electrician, allowing them to work independently on a wider range of projects.
  - **Specialization:** They can specialize in areas like residential, commercial, industrial, or renewable energy installations.
  - **Project Management:** With experience, they might transition into project management roles, overseeing electrical projects from start to finish.
  - **Electrical Inspector:** They can become inspectors to ensure that electrical installations meet regulatory standards.
  - **Further Education:** Pursuing additional certifications or degrees in electrical engineering can open doors to more advanced positions.
  - **Entrepreneurship:** Experienced electricians might start their own electrical contracting businesses.

Say

Let us now perform an activity based on various career opportunities available for an assistant false ceiling and dry wall installer.

Activity

- **Purpose:** Familiarize participants with diverse employment opportunities for an **Assistant Electrician**, highlighting roles, responsibilities, and potential career paths.
- **Resources Required:** PowerPoint Presentation, Handouts or printouts of job descriptions.
- **Tentative Duration:** 60 Mins
- **Procedure:**
    i. Explain the importance of an **Assistant Electrician** in the construction industry.
    ii. Emphasize the objective of exploring employment opportunities in the industry.
    iii. Encourage participants to share their initial thoughts on the roles and responsibilities of an **Assistant Electrician**.
    iv. Provide handouts or printouts of various employment opportunities in the construction industry as per different NSQF Levels.
    v. Discuss each opportunity, highlighting roles, responsibilities, and required skills.
    vi. Divide participants into small groups.
    vii. Assign each group a specific employment opportunity to discuss key aspects, qualifications, skills, and career progression.
    viii. Now ask each group to provide a short researched explanation of the opportunity assigned.
    ix. Summarize key points, emphasizing the range of career paths and the importance of an **Assistant Electrician**.

Expected outcome: Participants gain awareness of the wide range of employment opportunities in the construction industry, understand the specific roles and responsibilities of an **Assistant Electrician**, and will be inspired to explore potential career paths within the field.

Exercise

Key Solutions to PHB Exercise

1. **Career Path of an Assistant Electrician:**

   Helper Electrician -> Assistant Electrician -> Construction Electrician-LV -> Foreman Electrical Works (Construction) -> Supervisor Electrical Works

2. **Role and Responsibilities of an Assistant Electrician:**

   - Assisting in electrical system installation, maintenance, and repairs
   - Reading blueprints
   - Wiring and conduit installation
   - Assisting in installing switches, outlets, lighting
   - Testing systems
   - Troubleshooting
   - Following safety protocols
   - Learning from experienced electricians
   - Using tools
   - Keeping workspace organized.

3. **Personal Attributes Required by an Assistant Electrician:**

   - Attention to detail
   - Physical stamina
   - Problem-solving skills
   - Communication skills
   - Adaptability
   - Safety consciousness.

4. **Types of Construction:**

   - Residential Construction
   - Commercial Construction
   - Industrial Construction
   - Institutional Construction
   - Infrastructure Construction
   - Heavy Civil Construction
   - Green Construction
   - Renovation/Remodelling.

Notes

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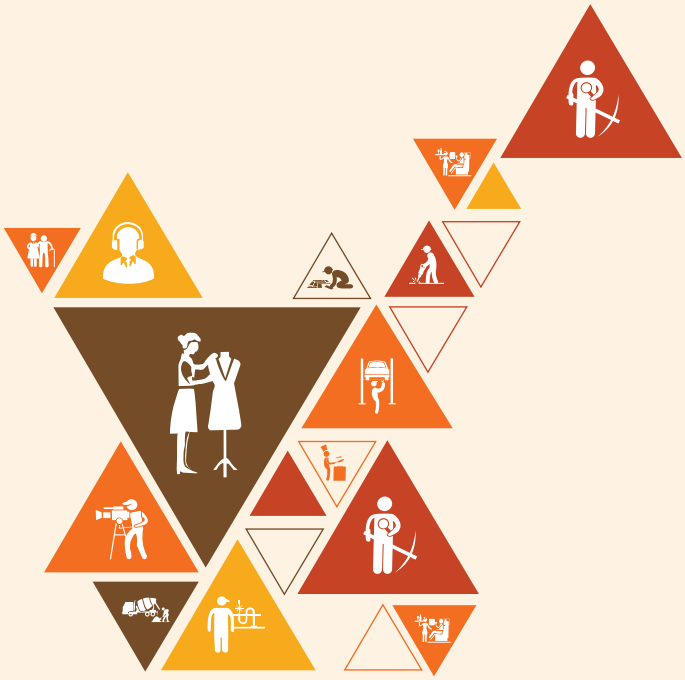
2. Handling Construction Hand and Power Tools

Unit 2.1 - Construction Hand and Power Tools



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Key Learning Outcomes

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

- Explain basic principle of electrical current flow and fundamental concept of alternate and direct current, voltage, resistance, temperature, cross section of conductors, etc.
- Explain Ampere's law, Ohm's law, and electromagnetic field.
- Explain the application of tester, mustimeter, digital ammeter etc.
- Interpret wiring symbols, SLDs, manufacturer's guidelines and electrical specifications.
- Discuss use of various electrical hand and power tools such as pliers, crimping tools, electrical drill machines, cutting machines etc. during electrical wiring of house/ building.
- Explain type of electrical devices like starters, relays and circuit breakers, their power ratings, working principles and use in circuits.
- Describe features of switches, fuses, resistors and various circuit protecting devices and their use in electrical circuits and connections.
- Discuss about the electrical measuring/ testing tools and devices such as voltage tester, earth tester, mustimeter, digital ammeter, meggers, tong tester, etc.
- Demonstrate how to check proper and safe working of hand and power tools.
- Perform fitting of conduits, cables wiring, fixing of electrical fixtures, electrical connection termination at power outlets, etc. using hand and power tools.
- Measure size and dimension of wires, conduits as per electrical installation/ maintenance work requirement using measuring instruments
- Perform basic inspections of electrical circuits/ wiring using electrical devices like ammeter, voltmeter, meggers, multi-meter, tong tester, earth tester, etc.
- Install electrical components like starter, circuit breakers, relays, etc.
- Perform maintenance of electrical tools, devices post use as per manufacturer's guidelines.

Unit 2.1: Construction Hand and Power Tools

Unit Objectives

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

- Explain basic principle of electrical current flow and fundamental concept of alternate and direct current, voltage, resistance, temperature, cross section of conductors, etc.
- Explain Ampere's law, Ohm's law, and electromagnetic field.
- Explain the application of tester, mustimeter, digital ammeter etc.
- Interpret wiring symbols, SLDs, manufacturer's guidelines and electrical specifications.
- Discuss use of various electrical hand and power tools such as pliers, crimping tools, electrical drill machines, cutting machines etc. during electrical wiring of house/ building.
- Explain type of electrical devices like starters, relays and circuit breakers, their power ratings, working principles and use in circuits.
- Describe features of switches, fuses, resistors and various circuit protecting devices and their use in electrical circuits and connections.
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- Measure size and dimension of wires, conduits as per electrical installation/ maintenance work requirement using measuring instruments
- Perform basic inspections of electrical circuits/ wiring using electrical devices like ammeter, voltmeter, meggers, multi-meter, tong tester, earth tester, etc.
- Install electrical components like starter, circuit breakers, relays, etc.
- •erform maintenance of electrical tools, devices post use as per manufacturer's guidelines.

Resources to be used

- **Theory**
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**

- Pliers, Screw Drivers (Set), Crimping Tools, Wire Strippers, Neon Tester, Ammeter, Voltmeter, Wattmeter, Ohmmeter, Digital Multimeter, Megger, Tong Tester, Measuring Tape, Spirit Level Marking Tools, Drilling Machine, Cutting Machine, Chasing Machine, Electrical Socket (Set), Tungsten Bulb/ CFL/FSL Bulb, Halogen Lamp, Wall Socket, Simple Switchboard, Mains Breaker, Switch, Earth Leakage Circuit Breaker (ELCB), Miniature Circuit Breaker (MCB), Helmet, Face Shield, Safety Goggles, Safety Shoes, Safety Belt, Insulated Rubber Gloves, Ear Plugs, Particle Masks, Reflective Jackets, Safety Message Boards, Fire Extinguishers, Sand Buckets.

Do

- Explain basic principle of electrical current flow and fundamental concept of alternate and direct current, voltage, resistance, temperature, cross section of conductors, etc.
- Explain Ampere's law, Ohm's law, and electromagnetic field.
- Explain the application of tester, mustimeter, digital ammeter etc.
- Interpret wiring symbols, SLDs, manufacturer's guidelines and electrical specifications.
- Explain use of various electrical hand and power tools such as pliers, crimping tools, electrical drill machines, cutting machines etc. during electrical wiring of house/ building.
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- Demonstrate how to check proper and safe working of hand and power tools.
- Explain fitting of conduits, cables wiring, fixing of electrical fixtures, electrical connection termination at power outlets, etc. using hand and power tools.
- Measure size and dimension of wires, conduits as per electrical installation/ maintenance work requirement using measuring instruments
- Perform basic inspections of electrical circuits/ wiring using electrical devices like ammeter, voltmeter, meggers, multi-meter, tong tester, earth tester, etc.
- Install electrical components like starter, circuit breakers, relays, etc.
- Perform maintenance of electrical tools, devices post use as per manufacturer's guidelines.

Notes for facilitation

- Use the **Assistant Electrician** PHB and refer unit 2.1 to explain Construction Hand and Power Tools.
- Basic Principles of Electrical Current Flow:
  - Electrical current flow involves the movement of charged particles (usually electrons) through a conductor.
  - **Direct Current (DC):** Current flows in one direction continuously, commonly found in batteries and electronic devices.
  - **Alternating Current (AC):** Current periodically changes direction, used in most household and industrial electrical systems.
  - **Voltage:** Electric potential difference that drives current flow.
  - **Resistance:** Opposition to current flow, measured in ohms.
  - **Temperature Effect:** Resistance increases with temperature.
- **Ampere's Law, Ohm's Law, and Electromagnetic Field:**
  - **Ampere's Law:** Describes the relationship between electric current and the magnetic field it creates.
  - **Ohm's Law:** Relates voltage, current, and resistance: V = I * R.
  - **Electromagnetic Field:** Generated when current flows through a conductor, creating a magnetic field around it.
- **Application of Electrical Testing Tools:**
  - **Tester:** Simple device to check for the presence of voltage.
  - **Multimeter:** Measures voltage, current, and resistance.
  - **Digital Ammeter:** Measures current in digital form.
  - **Megger:** Measures insulation resistance.
  - **Earth Tester:** Measures earth resistance.
- **Interpreting Wiring Symbols, Guidelines, and Specifications:**
  - **Wiring Symbols:** Pictorial representation of electrical components and connections.
  - **Single Line Diagrams (SLDs):** Simplified diagrams depicting the flow of electricity in a system.
  - **Manufacturer's Guidelines:** Instructions for proper use and installation of electrical equipment.
  - **Electrical Specifications:** Detailed requirements for electrical installations.
- **Use of Electrical Hand and Power Tools:**
  - **Pliers, Crimping Tools:** Used to manipulate wires and connectors.
  - **Electrical Drill Machines, Cutting Machines:** Used for making holes, cutting, and shaping materials.

- Importance of proper tool use for safety and efficiency.

- **Electrical Devices like Starters, Relays, Circuit Breakers:**
  - **Starters:** Devices to control motor operations, preventing overload.
  - **Relays:** Switching devices activated by electrical signals.
  - **Circuit Breakers:** Safeguard circuits by interrupting current in case of faults.
- **Features of Switches, Fuses, Resistors, Circuit Protecting Devices:**
  - **Switches:** Control the flow of current in a circuit.
  - **Fuses:** Protect circuits by melting when excessive current flows.
  - **Resistors:** Limit current flow, used for voltage division and current control.
  - **Circuit Protecting Devices:** Prevent damage due to overcurrent or short circuits.
- **Electrical Measuring/Testing Tools and Devices:**
  - **Voltage Tester:** Checks presence of voltage.
  - **Earth Tester:** Measures earth resistance for grounding.
  - **Multimeter, Digital Ammeter, Tong Tester:** Measure various electrical parameters.
- **Demonstrating Proper Tool Use and Electrical Connection:**
  - Ensuring tools are in good condition, using proper safety measures.
  - Properly fitting conduits, cables, and fixtures using appropriate tools.
- **Measuring Size and Dimension of Wires, Conduits:**
  - Using measuring instruments to ensure accurate sizing for installation.
- **Performing Basic Inspections of Electrical Circuits:**
  - Using tools to check current, voltage, and insulation resistance.
  - Identifying potential issues in circuits.
- **Installing Electrical Components:**
  - Properly connecting starters, circuit breakers, and relays in circuits.
- **Maintenance of Electrical Tools and Devices:**
  - Following manufacturer's guidelines to clean and store tools properly after use.

Say

Now, let's engage in a hands-on practical activity focused on using electrical hand and power tools effectively and safely.

Activity -1

Practical Demonstration of Electrical Hand and Power Tools

- **Purpose:** To provide participants with practical experience in using electrical hand and power tools commonly employed by **Assistant Electrician**s. Emphasizing the importance of proper tool usage for safety and efficiency.
- **Resources Required:** Assorted electrical hand and power tools, workstations, safety gear (goggles, gloves), safety guidelines presentation.
- **Tentative Duration:** 90 Minutes
- **Procedure:**
  - Begin by explaining the significance of proper tool usage in ensuring both personal safety and task efficiency.
  - Introduce the hand and power tools that will be demonstrated: Pliers, Crimping Tools, Electrical Drill Machines, and Cutting Machines.
  - Emphasize the specific purposes of each tool, such as manipulating wires and connectors, making holes, and cutting materials.
  - Present safety guidelines, stressing the use of appropriate safety gear and precautions when handling tools.
  - Demonstrate the correct use of each tool, highlighting key safety points and efficient techniques.
  - Divide participants into small groups.
  - Provide each group with a workstation equipped with the mentioned tools.
  - Assign specific tasks that require the use of the tools, such as stripping wires, crimping connectors, drilling holes, or cutting materials.
  - Circulate among the groups to offer guidance and address any questions.
  - Once tasks are completed, discuss the challenges and experiences faced by each group.
  - Summarize the importance of proper tool usage for both personal safety and work quality.

Expected Outcome: Participants will gain hands-on experience in using electrical hand and power tools, understanding their specific applications and safety protocols. They will grasp the importance of using tools correctly to ensure safety and efficiency while performing tasks in their roles as **Assistant Electrician**s.

Say

Let's now engage in a practical activity that focuses on interpreting wiring symbols, guidelines, and specifications – crucial skills for **Assistant Electrician**s.

Activity-2

Interpreting Wiring Symbols, Guidelines, and Specifications

- **Purpose:** To provide participants with hands-on experience in interpreting wiring symbols, Single Line Diagrams (SLDs), manufacturer's guidelines, and electrical specifications. Emphasizing the importance of accurate interpretation for successful electrical installations.
- **Resources Required:** Presentation with wiring symbols, SLDs, manufacturer's guidelines, electrical specifications, mock wiring diagrams, writing materials.
- **Tentative Duration:** 75 Minutes
- **Procedure:**
  - Begin by explaining the significance of accurately interpreting wiring symbols, SLDs, manufacturer's guidelines, and specifications in ensuring safe and efficient electrical installations.
  - Introduce the key components: Wiring Symbols, SLDs, Manufacturer's Guidelines, and Electrical Specifications.
  - Present examples of each component using visual aids such as wiring symbol charts, simplified SLDs, manufacturer's instruction manuals, and sample electrical specifications.
  - Walk through how to interpret each component, highlighting key details and common symbols.
  - Divide participants into pairs or small groups.
  - Distribute mock wiring diagrams with various symbols and specifications.
  - Instruct participants to work together to interpret the diagrams, referring to the guidelines and specifications.
  - Encourage discussion within the groups and clarification-seeking.
  - Ask each group to present their interpretation to the larger group, explaining their reasoning.
  - Summarize the session, emphasizing the importance of accurate interpretation for successful electrical installations and safe operations.

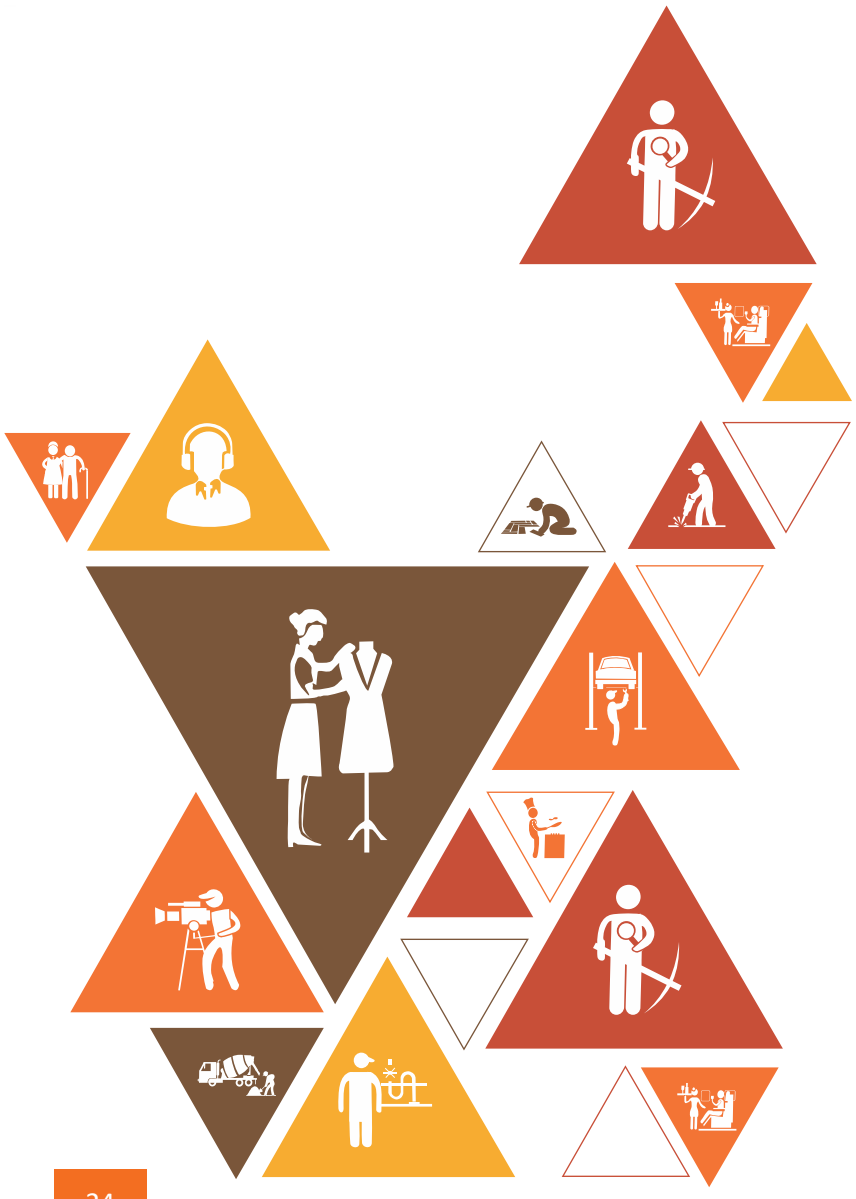
Expected Outcome: Participants will gain practical experience in interpreting wiring symbols, SLDs, manufacturer's guidelines, and electrical specifications. They will understand how to apply these skills to real-world scenarios, ensuring accurate and efficient electrical installations in their roles as **Assistant Electrician**s.

Exercise

Key Solutions to PHB Exercise

1. **Brief Explanations:**
    - **Electric Current:** Flow of electric charge through a conductor, measured in amperes (A).
    - **Series Circuit:** A circuit arrangement where components are connected end-to-end, allowing only one path for current.
    - **Circuit Breaker:** Automatic safety device that interrupts electrical current flow to protect a circuit from damage due to overcurrent or short circuit.
2. **Basic Hand Tools in Construction:**
    - Hammer, Screwdriver, Pliers, Tape Measure, Level, Chisel, Utility Knife, Wrenches.
3. **Electric Power Tools in Construction:**
    - Drill, Circular Saw, Jigsaw, Reciprocating Saw, Angle Grinder.
4. **Material Handling and Storage:**
    - **Material Handling:** Efficiently moving, controlling, and protecting materials during construction.
    - **Storage:** Properly storing materials to prevent damage, theft, or safety hazards.
5. **Measuring Devices with Examples:**
    - **Measuring Devices:** Tools used to assess dimensions, quantities, or levels.
    - **Examples:** Tape Measure (length), Spirit Level (levelling), Calipers (precise measurements), Laser Distance Meter (distance).
6. **Checking Hand and Power Tools:**
    - **Hand Tools:** Inspect for damage, ensure proper grips, blades, and heads are secure.
    - **Power Tools:** Check cords for damage, switches for proper functioning, safety guards in place.
7. **Electrical Devices (Starters, Relays, Circuit Breakers):**
    - **Starters:** Devices initiating motor operation by controlling current flow.
    - **Relays:** Electromagnetic switches controlled by smaller currents to control larger currents.
    - **Circuit Breakers:** Safeguard circuits by interrupting current during faults, available in various power ratings.

Notes



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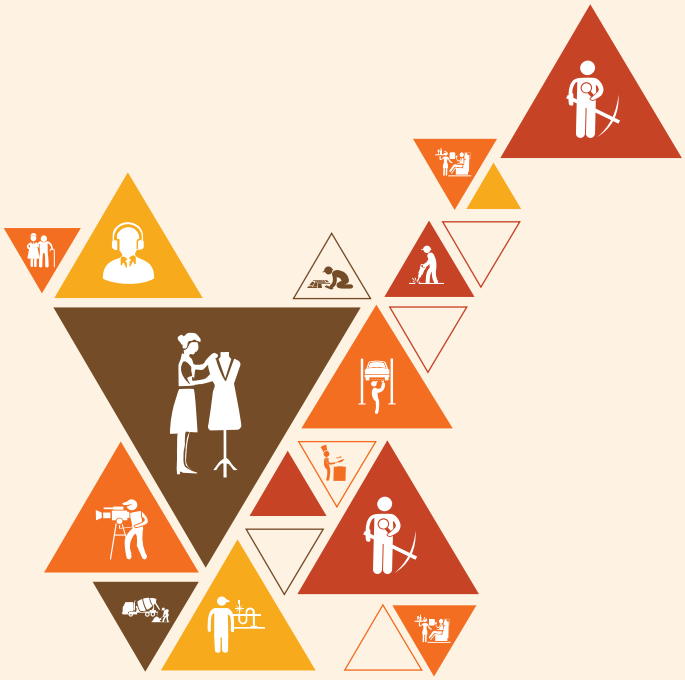
3. Installing Temporary Lighting

Unit 3.1 - Installing Temporary Lighting



CON/N0603

Key Learning Outcomes

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

- Interpret Single line diagram (SLD)/ schematics/electrical wiring diagrams for the requirements and specifications of temporary lighting arrangement at the construction site.
- Describe types of cables based on insulation, phase and their use as per power rating.
- Explain types of conduits and fixtures such as switches, sockets, their selection method and respective uses in electrical works.
- Describe types of safety equipment commonly used for protection of LV wiring circuits and their area of application.
- Explain standard/ safe practice of cable laying at construction sites such as through underground conduits, through poles.
- Describe types of lights units, their wattage and respective use in construction sites.
- Explain standard practices of fixing lights and their respective accessories.
- Explain type of faults associated with lighting arrangements.
- Explain type of tests to be undertaken in lighting units and its accessories such as voltage test, leakage test, power interruption/ continuity test etc.
- Explain standard conditions for storing and stacking electrical units, materials, fixtures, tools and devices.
- Describe safe procedure of erection and dismantling of temporary scaffolding, ladders or working platforms.
- Perform visual checks on electrical fixtures and materials related to lighting for their usability as per specified acceptance criteria.
- Select cables, lights and electrical fixtures depending upon electrical load requirement
- Perform laying of cables through underground and overhead as per requirement as per SLD/ schematics/ electrical wiring diagram
- Perform joining of cable in 'straight through joint' methods using PVC tapes or other safe methods
- Demonstrate termination of LV cables as per standard practice
- Demonstrate method of tagging electrical cables, underground electrical conduits by standard method
- Perform repairing of electrical lighting arrangements.
- Demonstrate methods of trace out short circuits, power interruptions/ continuity using appropriate electrical devices.
- Perform preventive maintenance on diesel generators.

Unit 3.1: Installing Temporary Lighting

Unit Objectives

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

- Interpret Single line diagram (SLD)/ schematics/electrical wiring diagrams for the requirements and specifications of temporary lighting arrangement at the construction site.
- Describe types of cables based on insulation, phase and their use as per power rating.
- Explain types of conduits and fixtures such as switches, sockets, their selection method and respective uses in electrical works.
- Describe types of safety equipment commonly used for protection of LV wiring circuits and their area of application.
- Explain standard/ safe practice of cable laying at construction sites such as through underground conduits, through poles.
- Describe types of lights units, their wattage and respective use in construction sites.
- Explain standard practices of fixing lights and their respective accessories.
- Explain type of faults associated with lighting arrangements.
- Explain type of tests to be undertaken in lighting units and its accessories such as voltage test, leakage test, power interruption/ continuity test etc.
- Explain standard conditions for storing and stacking electrical units, materials, fixtures, tools and devices.
- Describe safe procedure of erection and dismantling of temporary scaffolding, ladders or working platforms.
- Perform visual checks on electrical fixtures and materials related to lighting for their usability as per specified acceptance criteria.
- Select cables, lights and electrical fixtures depending upon electrical load requirement
- Perform laying of cables through underground and overhead as per requirement as per SLD/ schematics/ electrical wiring diagram
- Perform joining of cable in 'straight through joint' methods using PVC tapes or other safe methods
- Demonstrate termination of LV cables as per standard practice
- Demonstrate method of tagging electrical cables, underground electrical conduits by standard method
- Perform repairing of electrical lighting arrangements.
- Demonstrate methods of trace out short circuits, power interruptions/ continuity using appropriate electrical devices.
- Perform preventive maintenance on diesel generators.

Resources to be used

- **Theory**
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
  - Pliers, Screw Drivers (Set), Crimping Tools, Wire Strippers, Neon Tester, Ammeter, Voltmeter, Wattmeter, Ohmmeter, Digital Multimeter, Megger, Tong Tester, Measuring Tape, Spirit Level Marking Tools, Drilling Machine, Cutting Machine, Chasing Machine, Electrical Socket (Set), Tungsten Bulb/ CFL/FSL Bulb, Halogen Lamp, Wall Socket, Simple Switchboard, Mains Breaker, Switch, Earth Leakage Circuit Breaker (ELCB), Miniature Circuit Breaker (MCB), Helmet, Face Shield, Safety Goggles, Safety Shoes, Safety Belt, Insulated Rubber Gloves, Ear Plugs, Particle Masks, Reflective Jackets, Safety Message Boards, Fire Extinguishers, Sand Buckets.

Do

- Interpret Single line diagram (SLD)/ schematics/electrical wiring diagrams for the requirements and specifications of temporary lighting arrangement at the construction site.
- Describe types of cables based on insulation, phase and their use as per power rating.
- Explain types of conduits and fixtures such as switches, sockets, their selection method and respective uses in electrical works.
- Describe types of safety equipment commonly used for protection of LV wiring circuits and their area of application.
- Explain standard/ safe practice of cable laying at construction sites such as through underground conduits, through poles.
- Describe types of lights units, their wattage and respective use in construction sites.
- Explain standard practices of fixing lights and their respective accessories.
- Explain type of faults associated with lighting arrangements.
- Explain type of tests to be undertaken in lighting units and its accessories such as voltage test, leakage test, power interruption/ continuity test etc.
- Explain standard conditions for storing and stacking electrical units, materials, fixtures, tools and devices.
- Describe safe procedure of erection and dismantling of temporary scaffolding, ladders or working platforms.
- Perform visual checks on electrical fixtures and materials related to lighting for their usability as per specified acceptance criteria.
- Select cables, lights and electrical fixtures depending upon electrical load requirement
- Perform laying of cables through underground and overhead as per requirement as per SLD/ schematics/ electrical wiring diagram
- Perform joining of cable in ‘straight through joint’ methods using PVC tapes or other safe methods

- Demonstrate termination of LV cables as per standard practice
- Demonstrate method of tagging electrical cables, underground electrical conduits by standard method
- Perform repairing of electrical lighting arrangements.
- Demonstrate methods of trace out short circuits, power interruptions/ continuity using appropriate electrical devices.
- Perform preventive maintenance on diesel generators.

Notes for facilitation

- Use the **Assistant Electrician** PHB and refer unit 3.1 to explain Installation of Temporary Lighting.
- Interpreting Single Line Diagrams and Schematics for Temporary Lighting:
- Analyze diagrams to understand lighting requirements and specifications.
    - SLDs show electrical components and connections in a simplified manner.
- **Types of Cables and Their Use:**
    - **Based on Insulation:** PVC, XLPE; insulation type affects cable properties.
    - **Based on Phase:** Single-phase, three-phase; for different power distribution needs.
    - **Types of Conduits, Fixtures, and Their Selection:**
    - **Conduits:** Rigid metal, PVC; protect cables and wires.
    - **Fixtures:** Switches, sockets; selected based on location and function.
- **Safety Equipment for LV Wiring Protection:**
    - **Residual Current Devices (RCDs),** Ground Fault Circuit Interrupters (GFCIs); protect against electrical faults.
    - **Surge protectors,** circuit breakers; safeguard against overloads.
    - **Standard Cable** Laying Practices at Construction Sites:
    - **Through Underground Conduits:** Protects cables from physical damage.
    - **Through Poles:** Overhead cable placement, keeping them away from potential hazards.
- **Types of Lights Units and Their Uses:**
    - **Floodlights, spotlights;** used for general illumination or focused lighting.
    - **Wattage** depends on brightness requirements.
    - **Standard Practices of Fixing Lights and Accessories:**
    - **Mounting lights securely,** using appropriate hardware and fixtures.
- **Types of Faults Associated with Lighting:**

- Short circuits, open circuits, damaged cables; can cause lights to malfunction.

- **Tests for Lighting Units and Accessories:**
  - o Voltage Test: Checks proper voltage supply.
  - o Leakage Test: Detects current leakage.
  - o Power Interruption/Continuity Test: Ensures consistent power supply.
- **Standard Conditions for Storing Electrical Units and Materials:**
  - Dry, cool, well-ventilated areas to prevent damage or deterioration.
- **Safe Erection and Dismantling of Temporary Scaffolding:**
  - Following proper procedures to ensure stability and worker safety.
- **Visual Checks on Electrical Fixtures and Materials:**
  - Ensuring fixtures meet specified criteria for usability and safety.
- **Selecting Cables, Lights, and Electrical Fixtures:**
  - Based on electrical load and design requirements.
- **Laying Cables Through Underground and Overhead:**
  - Following SLDs and diagrams for proper cable placement.
- **Joining Cables in 'Straight Through Joint' Methods**:
  - Using safe techniques like PVC tape for secure connections.
- **Termination of LV Cables:**
  - Following standard practices for secure and proper terminations.
- **Tagging Electrical Cables and Conduits:**
  - Properly labelling cables and conduits for easy identification.
- **Repairing Electrical Lighting Arrangements:**
  - Fixing faults and restoring proper functionality.
- **Tracing Short Circuits and Power Interruptions:**
  - Using appropriate tools to locate and resolve issues.
- **Performing Preventive Maintenance on Diesel Generators:**
  - Regular maintenance to ensure proper functioning and longevity.

Activity -1

Identify and interpret the wiring symbols and single line diagrams which is commonly applicable for **Assistant Electrician** with respect to construction site activity. Also practice the activity related to understanding the manufacture guideline and electrical specification.

General Instructions:

- Conduct a group activity on identification of different electrical symbols.
- Ask the participants to assemble together.
- Distribute the practical activity format which includes task, duration allowed, specific instructions, method statements etc.
- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.

Sub Activity	Time	Resources
Identify electrical symbols	1 hour	Electrical symbols chart, Specification chart, Manufacture guidelines.
Identify electrical circuit/wiring diagram	1 hour	
Interpret electrical specifications	1 hour	
Interpret manufacturer's guidelines	1 hour	

Specific Instructions:

- Show the chart/ specifications/ guidelines and ask the participants to identify and read them one by one.
- Assist them by giving hints to remember the common symbols, for example a bulb is shown as a circle and a cross in the middle.
- Similarly explain the symbols in simple words and give relevant hints to identify and remember the same.
- Assess the level of understanding and change the instruction flow.
- Complete this activity in scheduled time, keep the discussion within the topic.
- Entertain doubts related to the topic only.
- Ask them to draw some 5 symbols and name them correctly at the end of the session.

Activity -2

Identification and use of electrical tools, devices, materials and equipment

Conduct a skill practice activity.

- Ask the participants to assemble together.
- Distribute the practical activity format which includes task, duration allowed, specific instructions, method statements etc.
- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.
- Maximum duration mentioned in the below table is for extensive practice and corresponding guidance until the skill is acquired by the participants.

Sub Activity	Time	Resources
Identify and use hand, power and measuring tools	4 hours	**Hand tools:** • Pliers • Screw Drivers (set) • Crimping tools • Wire strippers • Neon tester • Hacksaw **Power Tools:** • Cutting machine • Drill machine • Measuring devices: • Digital Multimeter • Tong tester • Megger • Measuring Instrument: • Measuring tapes • Markers
Identify the electrical devices and their use in circuits	4 hours	Safety equipment used in domestic and temporary wiring – fuse, MCB, MCCB ELCB, GFCI
Identify the different types of conduits and cables	4 hours	Cables, conduits and fixtures
Identify the types of lights used in construction sites	4 hours	Incandescent lamp (bulb), halogen bulb, fluorescent bulb, CFL, HPS, LED lights

Identify earthing equipment	3 hours	Earthing equipment
Organize the storage area with electrical units, materials, fixtures, tools and devices	3 hours	Electrical units, materials, fixtures, tools and devices

Exercise

Key Solutions to PHB Exercise

1) Types of Cables Based on Insulation, Phase, and Power Rating:
   - Based on Insulation: PVC (Polyvinyl Chloride), XLPE (Cross-linked Polyethylene).
   - Based on Phase: Single-phase, Three-phase.
   - Based on Power Rating and Use: Low Voltage (LV) Cables for distribution, Medium Voltage (MV) Cables for higher power applications.
2) Standard/Safe Practice of Cable Laying at Construction Sites:
   - Ensure proper cable route planning.
   - Use cable trays, conduits, or trenching as needed.
   - Adequate separation from other utilities.
   - Secure cables properly to prevent sagging.
   - Maintain cable bending radius to prevent damage.
   - Use cable markers for identification.
   - Follow safety regulations during installation.
3) Types of Light Units, Wattage, and Use in Construction Sites:
   - Floodlights (100W-1000W): Illuminate large areas, outdoor spaces.
   - High Bay Lights (250W-1000W): Illuminate high-ceiling indoor spaces.
   - Task Lights (50W-300W): Provide focused lighting for specific tasks.
   - Emergency Lights (15W-50W): Backup lighting during power outages.
4) Standard Conditions for Storing and Stacking Electrical Units, Materials, Fixtures, Tools, and Devices:
   - Store indoors or in weatherproof containers.
   - Keep materials away from moisture and direct sunlight.
   - Stack materials properly to prevent damage.
   - Store tools in dry, secure areas.
   - Follow manufacturer's guidelines for fixture storage.
   - Keep electrical devices and units dry and clean.
5) Safety Equipment for Protection of LV Wiring Circuits and Their Area of Application:
   - Residual Current Devices (RCDs): Protect against electric shock in circuits.
   - Circuit Breakers: Protect against overcurrent and short circuits.
   - Surge Protectors: Guard against voltage spikes and surges.
   - Insulation Resistance Testers: Measure insulation quality in circuits.
   - Ground Fault Circuit Interrupters (GFCIs): Prevent ground faults and shocks in outlets.

Notes

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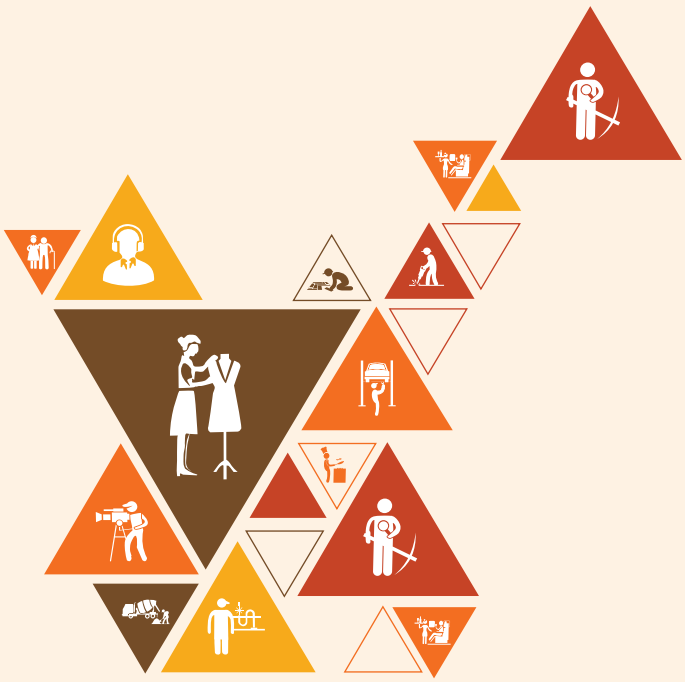
4. Assist in LV (low voltage) Electrical Wiring at Permanent Structures

Unit 4.1 - Conduit and Cable/Wire Laying

Unit 4.2 - Electrical Earthing Procedure in Domestic Wiring



CON/N0604

Key Learning Outcomes

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

- Type of electrical hazards associated with domestic wiring work, a consequence of faulty/ improper wiring works and standard safety control measures.
- Types of safety equipment commonly used for the protection of domestic wiring circuits and their area of application.
- Type of electrical materials and fixtures such as conduits, raceways, brackets, etc., used for domestic wiring works and their required acceptance criteria for use.
- Standard conduit laying and fixing procedures through brick and concrete structures.
- Standard practices of cable/ wire laying through conduits and tests to be done to ensure there is no breakage/ leakage from the wire.
- Electrical earthing procedure in domestic wiring and its importance
- Material, tools and equipment used for electrical earthing works.
- Test to be performed in domestic electrical wiring works using appropriate measuring devices.

Unit 4.1: Conduit and Cable/Wire Laying

Unit Objectives

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

- Understand type of electrical hazards associated with domestic wiring work, a consequence of faulty/ improper wiring works and standard safety control measures.
- Understand type of safety equipment commonly used for the protection of domestic wiring circuits and their area of application.
- Identify type of electrical materials and fixtures such as conduits, raceways, brackets, etc., used for domestic wiring works and their required acceptance criteria for use.
- Know the standard conduit laying and fixing procedures through brick and concrete structures.
- Know the standard practices of cable/ wire laying through conduits and tests to be done to ensure there is no breakage/ leakage from the wire.

Resources to be used

- **Theory**
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
  - Pliers, Screw Drivers (Set), Crimping Tools, Wire Strippers, Neon Tester, Ammeter, Voltmeter, Wattmeter, Ohmmeter, Digital Multimeter, Megger, Tong Tester, Measuring Tape, Spirit Level Marking Tools, Drilling Machine, Cutting Machine, Chasing Machine, Electrical Socket (Set), Tungsten Bulb/ CFL/FSL Bulb, Halogen Lamp, Wall Socket, Simple Switchboard, Mains Breaker, Switch, Earth Leakage Circuit Breaker (ELCB), Miniature Circuit Breaker (MCB), Helmet, Face Shield, Safety Goggles, Safety Shoes, Safety Belt, Insulated Rubber Gloves, Ear Plugs, Particle Masks, Reflective Jackets, Safety Message Boards, Fire Extinguishers, Sand Buckets.

Do

- Know the type of electrical hazards associated with domestic wiring work, a consequence of faulty/ improper wiring works and standard safety control measures.
- Know the type of safety equipment commonly used for the protection of domestic wiring circuits and their area of application.
- Know the type of electrical materials and fixtures such as conduits, raceways, brackets, etc., used for domestic wiring works and their required acceptance criteria for use.

- Know the standard conduit laying and fixing procedures through brick and concrete structures.
- Know the standard practices of cable/ wire laying through conduits and tests to be done to ensure there is no breakage/ leakage from the wire.

Notes for facilitation

- Use the **Assistant Electrician** PHB and refer unit 4.1 to explain Conduit and Cable/Wire Laying.
- Electrical Hazards and Safety Measures in Domestic Wiring:
  - Electrical hazards include shocks, burns, fires due to faulty wiring.
  - Consequences of faulty wiring include short circuits, electrocution, and fires.
  - Safety measures involve proper grounding, using circuit breakers, and following wiring codes.
- Safety Equipment for Protection of Domestic Wiring Circuits:
  - Residual Current Devices (RCDs), Ground Fault Circuit Interrupters (GFCIs): Protect against electrical faults.
  - Circuit breakers, surge protectors: Prevent overloads and power surges.
- Identifying Electrical Materials and Fixtures for Domestic Wiring:
  - Conduits, raceways, brackets: Used to route and secure wires.
  - Acceptance criteria involve proper sizing, durability, and compliance with regulations.
- Standard Conduit Laying and Fixing Procedures:
  - Conduit layout planning for optimal wire routing.
  - Properly fixing conduits through brick and concrete walls.
- Standard Practices of Cable/Wire Laying Through Conduits and Tests:
  - Pulling wires through conduits with proper tension and bending radius.
  - Tests include continuity, insulation resistance, and leakage tests to ensure wire integrity.

Activity -1

Cable laying through poles

Conduct a skill practice activity.

- Ask the participants to assemble together.
- Distribute the practical activity format which includes task, duration allowed, specific instructions, method statements etc.

- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.
- Maximum duration mentioned in the below table is for extensive practice and corresponding guidance until the skill is acquired by the participants

Sub Activity	Skill Practice	Time	Resources
1	Cable laying through poles at construction sites	8 hours	**Consumables:** • Single phase electrical cables of standard wire gauges • Conduits/ casings/ raceways • Electrical diagram (consisting only basic wiring symbols) • PVC insulation tape **Measuring devices:** • Digital Multimeter • Tong tester • Megger **Hand tools:** • Pliers • Screw Drivers (set) • Crimping tools • Wire strippers • Neon tester • Hacksaw **Power Tools:** • Cutting machine • Drill machine

2	Straight through joining of cables	8 hours	**Measuring Instrument:** • Measuring tapes • Markers **PPEs & safety equipment:** • Helmet • Safety shoes • Safety belt • Insulated rubber gloves • Ear plugs • Reflective jackets • Safety message boards • Fire extinguishers • Sand buckets
3	Cable termination	8 hours	
4	Fixing of temporary lights and their respective accessories	8 hours	
5	Electrical termination and cable glanding (method statement attached)	4 hours	
6	Faults associated with lighting arrangements	4 hours	
7	Tracing short circuits, power interruptions continuity	4 hours	

Figure 1

Specific Instructions:

- For this activity prior setup with two poles erected with 10 m height, 20 m apart is required.
- Ensure that there is one supply feed conductor.
- Make sure all the participants are wearing proper PPEs.
- Explain the overall procedure and key points of the laying and fixing of cable through poles before commencing the exercise.
- Check & observe that all the steps followed by the participants.
- Seal all the joints of the conduits with couplers, junction boxes, fan-boxes, bends etc.
- Ensure to leave a pull wire in the empty conduit.
- Ensure occupancy volume for conduit is 60% of the volume.
- Follow the colour code while wiring is to be brought out.
- Ensure proper dressing is carried out at DB, Switch board end points after drawing the wires.
- Carryout corresponding quality checks such as load details of lay out and DB load list.
- Complete the activity in scheduled time, at the end of activity, to assess the skill and knowledge acquired, call a person randomly from the group and ask him to explain the steps involved in

laying the cable through poles.

- Follow the method statement of Cable Glanding

Method statement of Cable Glanding:

1. **Preparation:**
   - Identify the cable type, size, and specification required for termination.
   - Ensure all necessary tools, equipment, and materials are available and in good condition.
   - Check the cable's insulation and jacket for any damage. Replace if needed.
   - Ensure that the work area is clean, organized, and well-lit.
2. **Cable Preparation:**
   - Cut the cable to the required length, leaving some extra length for flexibility during termination.
   - Strip the cable's outer sheath using appropriate tools, ensuring not to damage the inner insulation.
3. **Gland Selection:**
   - Choose the appropriate gland kit based on the cable type, size, and application.
   - Check that the gland kit includes the required components like lock nuts, washers, and seals.
4. **Cable Glanding:**
   - Thread the cable through the gland and ensure that the cable's outer sheath is properly seated within the gland's seal.
   - Tighten the gland's lock nut onto the threaded section of the gland body, using spanners or wrenches. Ensure a secure fit.
5. **Sealing and Bonding (if required):**
   - Apply sealing compounds or tapes as specified in the project requirements to ensure a water-tight and dust-free seal.
   - Allow sufficient curing time if using sealing compounds or adhesives.
6. **Cable Cleating (if required):**
   - Install cable cleats, if specified, to ensure proper cable management and prevent cable movement.
7. **Cable Identification:**
   - Attach cable identification tags to the cable, specifying its purpose, location, and any relevant details.
8. **Final Inspection:**
   - Visually inspect the glanded termination to ensure it's properly sealed, secure, and free from defects.

- Ensure that the cable is properly routed and supported using cable ties.

9. Documentation:

- Record the details of the glanded termination, including cable type, size, termination date, and location.

10. Completion and Reporting:

- Notify relevant personnel of the completed cable termination.
- Report any issues, deviations, or observations during the process to the supervisor.

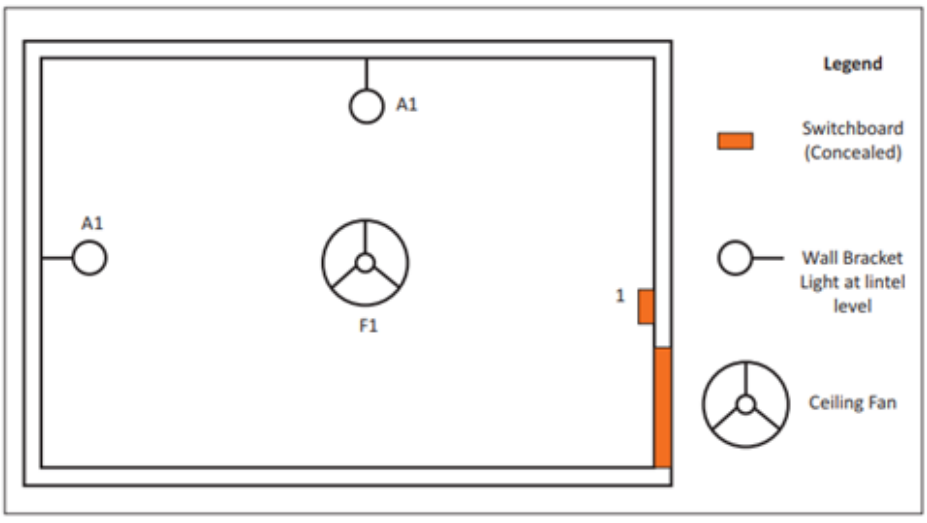
Activity -2

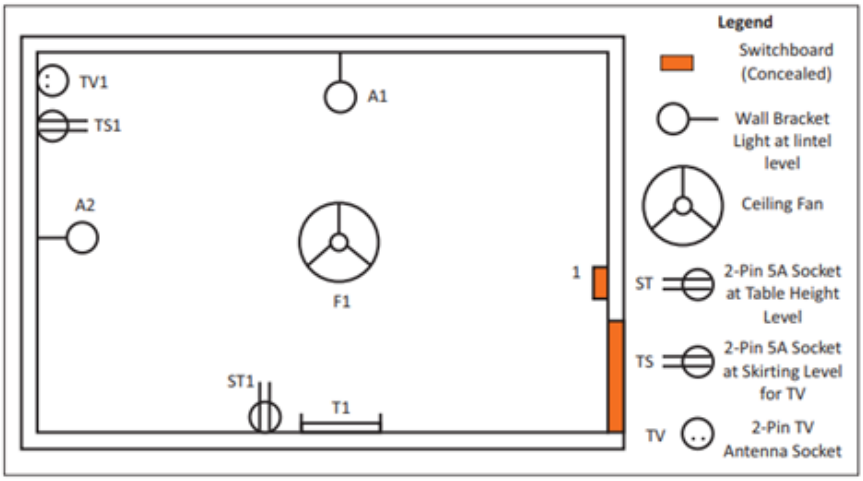
Conduit laying, wiring and fixing the fixtures through brick structures

Conduct a skill practice activity.

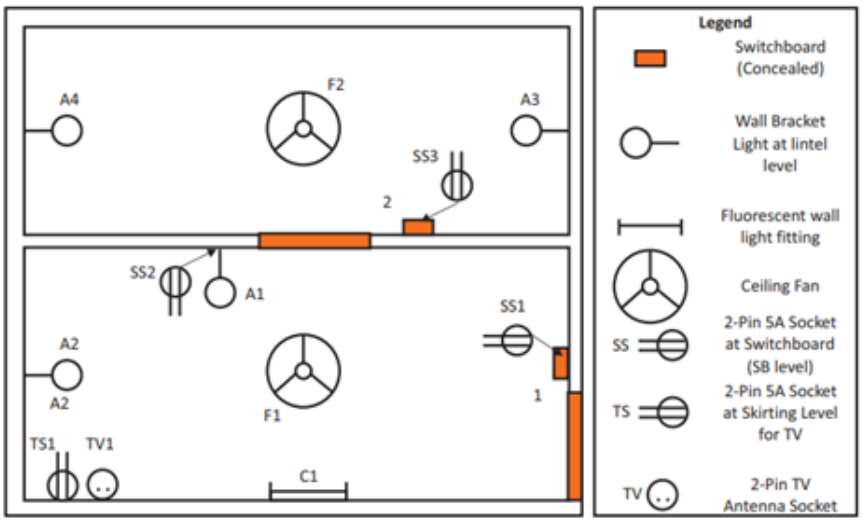
- Lay conduits and provide wiring for fixtures for the layout as given below, ceiling height of 10 feet.
- Assume the data whichever is needed for the activity.
- Ask the participants to assemble together.
- Distribute the practical activity format which includes task, duration allowed, specific instructions, method statements etc.
- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.
- Maximum duration mentioned in the below table is for extensive practice and corresponding guidance until the skill is acquired by the participants.

Electrical conduit/wiring layout drawings:

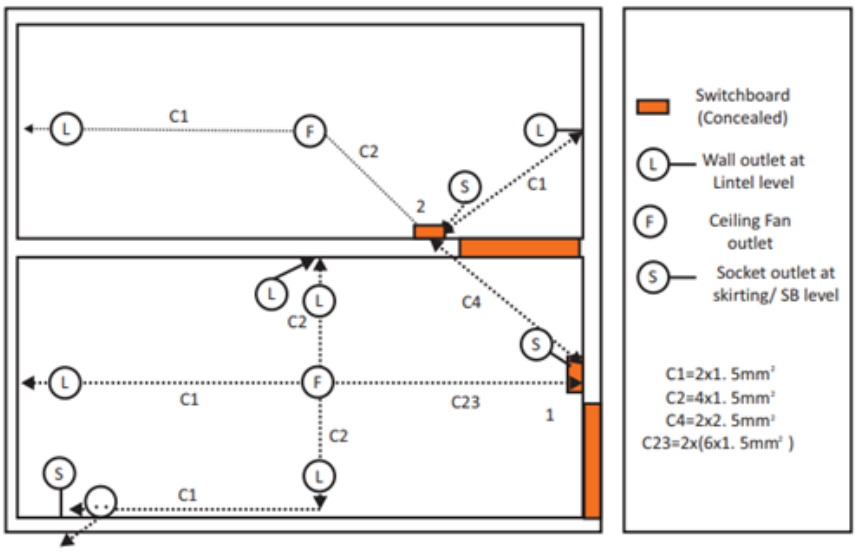




Fittings and Fixture Layout



Conduit Layout



Sub Activity	Skill Practice	Time	Resources
1	Laying of conduits through wall chases for a light, fan, and television along with pull wires	8 hours	**Consumables:** • Single phase electrical cables of standard wire gauges • Conduits/ casings/ raceways • Electrical diagram (consisting only basic wiring symbols) • PVC insulation tape **Measuring devices:** • Digital Multimeter • Tong tester • Megger **Hand tools:** • Pliers • Screw Drivers (set) • Crimping tools • Wire strippers • Neon tester • Hacksaw **Power Tools:** • Cutting machine • Drill machine **Measuring Instrument:** • Measuring tapes • Markers **PPEs & safety equipment:** • Helmet • Safety shoes • Safety belt • Insulated rubber gloves • Ear plugs • Reflective jackets • Safety message boards • Fire extinguishers • Sand buckets
2	Pulling and pushing the wires	6 hours	
3	Joining of wires	4 hours	

4	Fixing of light, fan and television fixtures	4 hours	
5	Fixing of light, fan and outlet for television	4 hours	
6	Electrical termination and dressing of wires at all the points	4 hours	
7	Faults associated with lighting arrangements	4 hours	
8	Tracing short circuits, power interruptions continuity	4 hours	

Specific Instructions:

- Make sure all the participants are wearing proper PPEs.
- Explain the overall procedure and key points of the laying and fixing of cable through poles before commencing the exercise.
- Check & observe that all the steps followed by the participants.
- Seal all the joints of the conduits with couplers, junction boxes, fan-boxes, bends etc.
- Ensure to leave a pull wire in the empty conduit.
- Ensure occupancy volume for conduit is 60% of the volume.
- Follow the colour code while wiring is to be brought out.
- Ensure proper dressing is carried out at DB, Switch board end points after drawing the wires.
- Carryout corresponding quality checks such as load details of lay out and DB load list.
- Complete the activity in scheduled time, at the end of activity, to assess the skill and knowledge acquired, call a person randomly from the group and ask him to explain the steps involved in laying the cable through poles.

Notes

Unit 4.2: Electrical Earthing Procedure in Domestic Wiring

Unit Objectives

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

- Explain the electrical earthing procedure in domestic wiring and its importance
- Describe the material, tools and equipment used for electrical earthing works.
- Explain the test to be performed in domestic electrical wiring works using appropriate measuring devices.
- Know the standard practices of cable/ wire laying through conduits and tests to be done to ensure there is no breakage/ leakage from the wire.

Resources to be used

- **Theory**
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
  - Pliers, Screw Drivers (Set), Crimping Tools, Wire Strippers, Neon Tester, Ammeter, Voltmeter, Wattmeter, Ohmmeter, Digital Multimeter, Megger, Tong Tester, Measuring Tape, Spirit Level Marking Tools, Drilling Machine, Cutting Machine, Chasing Machine, Electrical Socket (Set), Tungsten Bulb/ CFL/FSL Bulb, Halogen Lamp, Wall Socket, Simple Switchboard, Mains Breaker, Switch, Earth Leakage Circuit Breaker (ELCB), Miniature Circuit Breaker (MCB), Helmet, Face Shield, Safety Goggles, Safety Shoes, Safety Belt, Insulated Rubber Gloves, Ear Plugs, Particle Masks, Reflective Jackets, Safety Message Boards, Fire Extinguishers, Sand Buckets.

Do

- Explain the electrical earthing procedure in domestic wiring and its importance
- Describe the material, tools and equipment used for electrical earthing works.
- Explain the test to be performed in domestic electrical wiring works using appropriate measuring devices.

Notes for facilitation

- Use the **Assistant Electrician** PHB and refer unit 4.2 to explain Electrical Earthing Procedure in Domestic Wiring.
- Electrical Earthing Procedure in Domestic Wiring and its Importance:
  - Electrical earthing involves connecting electrical systems to the ground to prevent electric shocks and fires.
  - It provides a path for fault currents to safely dissipate into the earth.
  - Importance: Protects people and equipment by ensuring that excess current flows safely away.
- Materials, Tools, and Equipment for Electrical Earthing:
  - **Materials:** Copper or galvanized steel rods, earthing conductors, earthing electrodes.
  - **Tools:** Digging tools for rod installation, clamps for connecting conductors.
  - **Equipment:** Earth testers to measure resistance.
- Tests in Domestic Electrical Wiring Using Measuring Devices:
  - **Continuity Test:** Checks if a circuit is complete and conductive.
  - **Insulation Resistance Test:** Measures the insulation resistance of wires and cables.
  - **Earth Resistance Test:** Measures the resistance between an electrical system and the ground.

Activity -1

Conduct a skill practice activity.

- Ask the participants to assemble together.
- Distribute the practical activity format which includes task, duration allowed, specific instructions, method statements etc.
- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.
- Maximum duration mentioned in the below table is for extensive practice and corresponding guidance until the skill is acquired by the participants.

Skill Practice	Time	Resources
Carryout plate earthing	8 hours	Consumables: • Single phase electrical cables of standard wire gauges • Conduits/ casings/ raceways • Electrical diagram (consisting only basic wiring symbols) • PVC insulation tape Measuring devices: • Digital Multimeter • Tong tester • Megger Hand tools: • Pliers • Screw Drivers (set) • Crimping tools • Wire strippers • Neon tester • Hacksaw Power Tools: • Cutting machine • Drill machine Measuring Instrument: • Measuring tapes • Markers PPEs & safety equipment: • Helmet • Safety shoes • Safety beltInsulated rubber gloves • Ear plugs • Reflective jackets • Safety message boards • Fire extinguishers • Sand buckets

2	Measure ground resistance	4 hours	
3	Carryout earthing in temporary panels	4 hours	
4	Carry out earthing in domestic wiring	4 hours	
5	Carry out earthing in electrical appliances	4 hours	

Specific Instructions:

- Make sure all the participants are wearing proper PPEs.
- Explain the overall procedure and key points of the plate earthing before commencing the exercise.
- Check & observe that all the steps followed by the participants.
- Complete the activity in scheduled time, at the end of activity, to assess the skill and knowledge acquired, call a person randomly from the group and ask him to explain the steps involved in plate earthing.

Activity -2

Conduct a skill practice activity.

- Ask the participants to assemble together.
- Distribute the practical activity format which includes task, duration allowed, specific instructions, method statements etc.
- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.

Skill Practice	Time	Resources
Carryout plate earthing	8 hours	**Consumables:** • Single phase electrical cables of standard wire gauges • Conduits/ casings/ raceways

Measure ground resistance	4 hours	• Electrical diagram (consisting only basic wiring symbols) • PVC insulation tape **Measuring devices:** • Digital Multimeter • Tong tester • Megger **Hand tools:** • Pliers • Screw Drivers (set) • Crimping tools • Wire strippers • Neon tester • Hacksaw **Power Tools:** • Cutting machine • Drill machine **Measuring Instrument:** • Measuring tapes • Markers **PPEs & safety equipment:** • Helmet • Safety shoes • Safety belt • Insulated rubber gloves • Ear plugs • Reflective jackets • Safety message boards • Fire extinguishers • Sand buckets
Carryout earthing in temporary panels	4 hours	
Carry out earthing in domestic wiring	4 hours	
Carry out earthing in electrical appliances	4 hours	

Specific Instructions:

- Make sure all the participants are wearing proper PPEs.
- Explain the overall procedure and key points of the pipe earthing before commencing the exercise.
- Check & observe that all the steps followed by the participants.
- Complete the activity in scheduled time, at the end of activity, to assess the skill and knowledge acquired, call a person randomly from the group and ask him to explain the steps involved in pipe earthing.

Exercise

Key Solutions to PHB Exercise

1. Potential Electrical Hazards in Domestic Wiring:
    - Electric shock due to faulty insulation.
    - Fire risk from overheating or short circuits.
    - Electrocution due to improper grounding.
    - Explosion risk from gas leaks near electrical sources.
2. Consequences of Faulty or Improper Wiring in Residential Settings:
    - Risk of fire leading to property damage or loss.
    - Electrical shocks and potential injury.
    - Malfunctioning or damage to electrical devices.
    - Unreliable or disrupted power supply.
3. Safety Equipment for Overcurrent Protection in Domestic Wiring:
    - Miniature Circuit Breakers (MCBs).
    - Residual Current Devices (RCDs).
    - Fuses.
4. Materials Used for Domestic Wiring Protection and Routing:
    - PVC Conduits.
    - Metal Conduits.
    - Cable Trays.
5. Purpose of Using Conduits in Domestic Wiring:
    - Protection of cables from mechanical damage.
    - Routing and organizing cables.
    - Enhancing aesthetics by concealing cables.
6. Acceptance Criteria for Conduit Materials in Domestic Wiring:
    - Non-corrosive and durable.
    - Suitable size and capacity.
    - Compliant with relevant standards.
7. Standard Safety Control Measures for Domestic Wiring:
    - Adhering to electrical codes and regulations.

- Proper grounding and earthing.
- Use of safety devices like MCBs and RCDs.
- Adequate insulation and cable protection.

8. Purpose of Raceways in Electrical Installations:

- Protecting and routing electrical cables.
- Concealing cables for aesthetic purposes.

9. Common Practices for Laying Conduits Through Brick and Concrete Structures:

- Use proper tools for drilling holes.
- Secure conduits with clamps or brackets.
- Seal openings to prevent moisture.

10. Tests for Conduit Wiring Integrity:

- Continuity test to check for breaks or leakages.
- Insulation resistance test.

11. Purpose of Electrical Earthing in Domestic Wiring:

- Diverting fault currents to the ground, preventing electric shock and fire hazards.

12. Tools and Equipment for Installing an Earthing System:

- Copper grounding rods.
- Earthing wire.
- Earthing clamp.

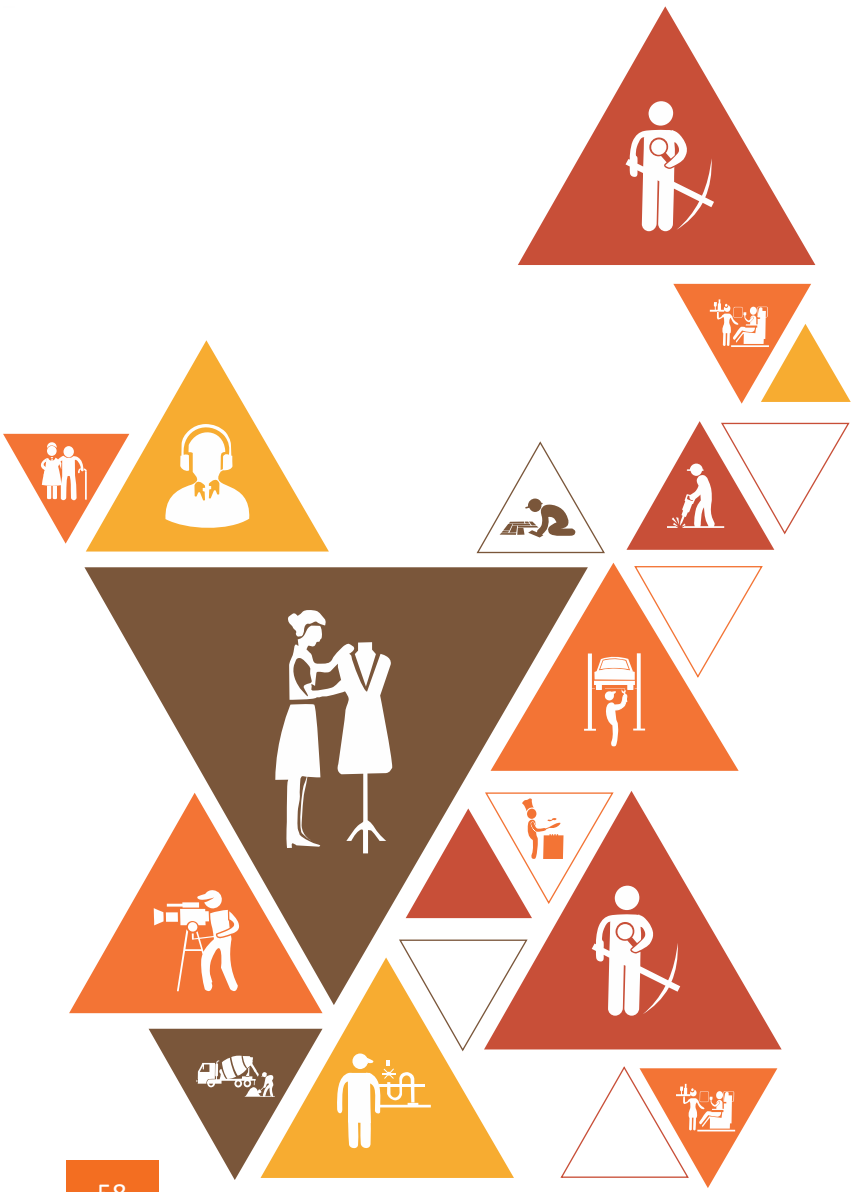
13. Purpose of Continuity Test in Domestic Electrical Wiring:

- To ensure proper connection and conductivity in wiring.

14. Pipe or Plate Earthing Method:

- This method involves connecting the electrical system to a metal pipe or plate buried in the ground, ensuring a low-resistance path for fault currents to dissipate safely.

Notes



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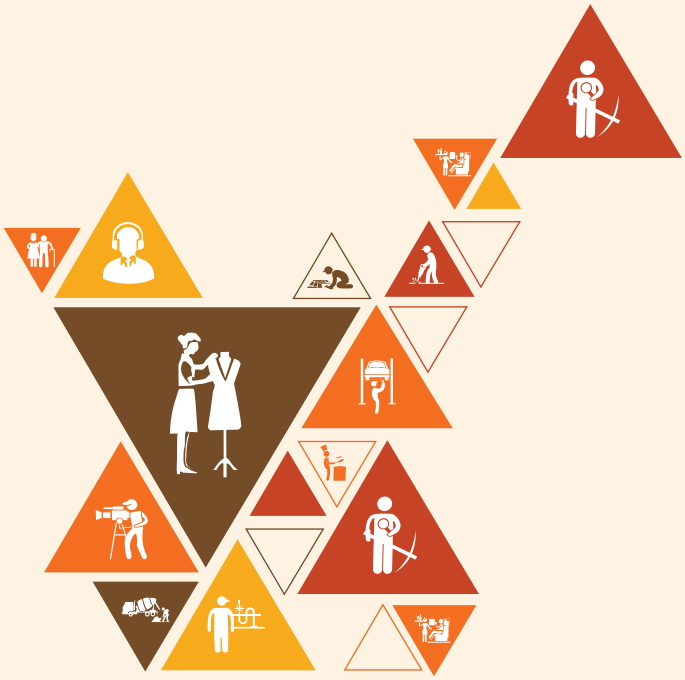
5. Assembling, Installing and Maintaining Temporary LV Electrical Panels

Unit 5.1 - Installation and Maintenance of Temporary LV Electrical Panels

Unit 5.2 - Faults Associated with Temporary Electrical Panels

Unit 5.3 - Tests and Quality Checks



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Key Learning Outcomes

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

- Types of conduits and fixtures such as switches, sockets, MCBs, wire their selection criteria.
- Method of connection temporary panel/ Distribution boards (DB) with main power outlet.
- Power rating of fixtures to be used in panel/ DB.
- Type of faults associated with temporary electrical panels/ DBs and its accessories.
- Standard procedure of shifting and installing DBs at different locations.
- Type of tests to be undertaken in temporary panels/ DBs and its accessories such as voltage test, leakage test, power interruption/ continuity test etc.
- Methods of trace out short circuits, power interruptions/ continuity using appropriate electrical devices.
- Electrical earthing procedure in temporary panels and its importance.
- Specification and details of material, tools and equipment used for electrical earthing works.
- Standard storing and stacking procedures of electrical units, materials, fixtures, tools and devices.

Unit 5.1 - Installation and Maintenance of Temporary LV Electrical Panels

Unit Objectives

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

- Understand the method of connecting temporary panel/DBs with main power outlet.
- Understand the method of electrical termination at power outlets using appropriate fixtures.
- Recognize the standard procedure of shifting and installing DBs among different work location.

Resources to be used

- **Theory**
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
  - Pliers, Screw Drivers (Set), Crimping Tools, Wire Strippers, Neon Tester, Ammeter, Voltmeter, Wattmeter, Ohmmeter, Digital Multimeter, Megger, Tong Tester, Measuring Tape, Spirit Level Marking Tools, Drilling Machine, Cutting Machine, Chasing Machine, Electrical Socket (Set), Tungsten Bulb/ CFL/FSL Bulb, Halogen Lamp, Wall Socket, Simple Switchboard, Mains Breaker, Switch, Earth Leakage Circuit Breaker (ELCB), Miniature Circuit Breaker (MCB), Helmet, Face Shield, Safety Goggles, Safety Shoes, Safety Belt, Insulated Rubber Gloves, Ear Plugs, Particle Masks, Reflective Jackets, Safety Message Boards, Fire Extinguishers, Sand Buckets.

Do

- Explain the method of connecting temporary panel/DBs with main power outlet.
- Explain the method of electrical termination at power outlets using appropriate fixtures.
- Explain the standard procedure of shifting and installing DBs among different work location.

Notes for facilitation

- Use the **Assistant Electrician** PHB and refer unit 5.1 to explain Installation and Maintenance of Temporary LV Electrical Panels.
- Connecting Temporary Panel/DBs to Main Power Outlet:
  - Use appropriate cables rated for the load.

- Connect the incoming supply cables to the panel's main breaker.
- Ensure proper grounding by connecting the earth wire.
- Install circuit breakers for different loads.
- Connect each circuit's live, neutral, and ground wires to respective terminals.

- **Electrical Termination at Power Outlets:**
  - Strip the insulation from the wires.
  - Connect the live wire (usually black or red) to the brass or red terminal on the outlet.
  - Connect the neutral wire (usually white) to the silver terminal.
  - Connect the ground wire (usually green or bare) to the green terminal.
  - Tighten terminal screws securely to ensure good contact.
- **Shifting and Installing DBs Among Different Work Locations:**
  - Turn off the power supply to the DB.
  - Disconnect all wires from the terminals.
  - Carefully remove the DB from the current location.
  - Prepare the new location, ensuring proper mounting and spacing.
  - Install the DB in the new location and secure it.
  - Reconnect the wires to their appropriate terminals.
  - Double-check connections and tighten screws.
  - Turn on the power supply and test the DB for proper functioning.

Activity -1

Conduct a skill demonstration activity.

- Ask the participants to assemble together.
- Distribute the practical activity format which includes task, duration allowed, specific instructions, method statements etc.
- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.
- Maximum duration mentioned in the below table is for extensive practice and corresponding guidance until the skill is acquired by the participants.

Skill Practice	Time	Resources
Install electrical panel/ distribution board	8 hours	**Consumables:** • Single phase electrical cables of standard wire gauges • Conduits/ casings/ raceways • Electrical diagram (consisting only basic wiring symbols) • PVC insulation tape **Measuring devices:** • Digital Multimeter • Tong tester • Megger **Hand tools:** • Pliers • Screw Drivers (set) • Crimping tools • Wire strippers • Neon tester • Hacksaw **Power Tools:** • Cutting machine • Drill machine **Measuring Instrument:** • Measuring tapes • Markers **PPEs & safety equipment:** • Helmet • Safety shoes • Safety belt • Insulated rubber gloves • Ear plugs • Reflective jackets • Safety message boards • Fire extinguishers • Sand buckets
Carryout electrical termination and cable glanding	4 hours	
Check for faults associated with distribution boards	4 hours	
Carryout quality checks for electrical panels/DB	4 hours	

Specific Instructions:

- Make sure all the participants are wearing proper PPEs
- Explain the overall procedure and key points of the installation distribution boards and check for faults before commencing the exercise

Notes

Unit 5.2: Faults Associated with Temporary Electrical Panels

Unit Objectives

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

- Understand the types of faults associated with temporary electrical panels/DBs and its accessories cation.

Resources to be used

- **Theory**
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
  - Pliers, Screw Drivers (Set), Crimping Tools, Wire Strippers, Neon Tester, Ammeter, Voltmeter, Wattmeter, Ohmmeter, Digital Multimeter, Megger, Tong Tester, Measuring Tape, Spirit Level Marking Tools, Drilling Machine, Cutting Machine, Chasing Machine, Electrical Socket (Set), Tungsten Bulb/ CFL/FSL Bulb, Halogen Lamp, Wall Socket, Simple Switchboard, Mains Breaker, Switch, Earth Leakage Circuit Breaker (ELCB), Miniature Circuit Breaker (MCB), Helmet, Face Shield, Safety Goggles, Safety Shoes, Safety Belt, Insulated Rubber Gloves, Ear Plugs, Particle Masks, Reflective Jackets, Safety Message Boards, Fire Extinguishers, Sand Buckets.

Do

- Explain the types of faults associated with temporary electrical panels/DBs and its accessories cation.

Notes for facilitation

- Use the **Assistant Electrician** PHB and refer unit 5.2 to explain Faults Associated with Temporary Electrical Panels.
- Types of Faults Associated with Temporary Electrical Panels/DBs and Their Caution:
  - **Overloading:** Exceeding the panel's capacity due to excessive loads. Caution: Monitor load limits and distribute loads evenly.
  - **Short Circuits:** Direct contact between live and neutral wires. Caution: Ensure proper insulation and use circuit protection.

- **Ground Faults:** Connection between live wire and grounding. Caution: Maintain proper grounding to prevent shocks.
- **Loose Connections:** Insecure wire connections. Caution: Regularly inspect and tighten connections.
- **Improper Earthing:** Inadequate grounding. Caution: Ensure effective grounding for safety.
- **Insufficient Insulation:** Exposed wires. Caution: Insulate all wires and connections properly.
- **Incorrect Breaker Sizing:** Using incorrect-rated circuit breakers. Caution: Use breakers suitable for load requirements.
- **To prevent these faults,** prioritize regular inspections, proper installation, and strict adherence to safety guidelines for temporary electrical panels/DBs and their accessories.

Say

Let's engage in a practical activity aimed at understanding and addressing various types of faults associated with temporary electrical panels/DBs, with a specific focus on improper earthing and its cautionary measures.

Activity

Investigating Improper Earthing in Temporary Electrical Panels/DBs

- **Purpose:** This activity intends to familiarize participants with the risks of improper earthing in temporary electrical panels/DBs and emphasize the importance of effective grounding.
- **Resources Required:** Sample temporary electrical panel/DB setup, grounding components, multimeter, grounding wire.
- **Tentative Duration:** 45 Minutes
- **Procedure:**
  - **Introduction:** Begin by explaining the significance of proper earthing in electrical systems and the potential hazards associated with inadequate grounding.
  - **Scenario Setup:** Display a sample temporary electrical panel/DB setup that lacks proper grounding.
  - Task - Identify Improper Earthing:
    - In pairs, participants inspect the setup to identify signs of improper earthing.
    - They note observations such as missing or incorrectly connected grounding wires.

- **Discussion - Consequences:** As a group, discuss the potential consequences of inadequate grounding, including the risk of electric shocks and equipment damage.
- **Safety Measures - Caution:** Explain the cautionary measures necessary to ensure proper grounding:
  - Secure proper grounding connections.
  - Use grounding wires of appropriate thickness and material.
  - Follow electrical codes and standards.
- **Demonstration - Correcting Improper Earthing:**
  - Demonstrate the correct method of establishing effective grounding by connecting a grounding wire to the panel/DB.
- **Hands-On Practice - Grounding Test:**

  Provide a multimeter and a grounding wire.

  Participants measure the resistance between the grounding wire and a designated grounding point on the panel/DB.
- **Discussion - Testing Results:**
  - Participants share their resistance measurements.
  - Compare results with acceptable ranges to determine if the grounding is within proper limits.
- **Conclusion:** Summarize the importance of identifying and rectifying improper earthing in electrical installations to mitigate safety risks and maintain equipment integrity.

Expected Outcome: By participating in this activity, participants will develop a keen awareness of the consequences of inadequate grounding in temporary electrical panels/DBs. They will gain hands-on experience in recognizing improper earthing signs and performing grounding tests, contributing to their competency in ensuring secure electrical installations.

Notes

Unit 5.3: Tests and Quality Checks

Unit Objectives

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

- List the type of tests to be undertaken in lighting units and its accessories.
- State the methods to trace out short circuit, power interruptions/continuity using appropriate electrical devices.
- Recall the tests to be done to ensure that there is no breakage/leakage from the wire.
- List the tests to be performed in domestic electrical wiring works using appropriate measuring devices.
- State the type of tests to be undertaken in temporary panels/DBs and its accessories

Resources to be used

- **Theory**
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
  - Pliers, Screw Drivers (Set), Crimping Tools, Wire Strippers, Neon Tester, Ammeter, Voltmeter, Wattmeter, Ohmmeter, Digital Multimeter, Megger, Tong Tester, Measuring Tape, Spirit Level Marking Tools, Drilling Machine, Cutting Machine, Chasing Machine, Electrical Socket (Set), Tungsten Bulb/ CFL/FSL Bulb, Halogen Lamp, Wall Socket, Simple Switchboard, Mains Breaker, Switch, Earth Leakage Circuit Breaker (ELCB), Miniature Circuit Breaker (MCB), Helmet, Face Shield, Safety Goggles, Safety Shoes, Safety Belt, Insulated Rubber Gloves, Ear Plugs, Particle Masks, Reflective Jackets, Safety Message Boards, Fire Extinguishers, Sand Buckets.

Do

- Explain the type of tests to be undertaken in lighting units and its accessories.
- Explain the methods to trace out short circuit, power interruptions/continuity using appropriate electrical devices.
- Explain the tests to be done to ensure that there is no breakage/leakage from the wire.
- Explain the tests to be performed in domestic electrical wiring works using appropriate measuring devices.
- Explain the type of tests to be undertaken in temporary panels/DBs and its accessories.

Notes for facilitation

- Use the **Assistant Electrician** PHB and refer unit 5.3 to explain Tests and Quality Checks.
- Tests for Lighting Units and Accessories:
  - **Insulation Test:** Checks for proper insulation to prevent short circuits.
  - **Voltage Test:** Ensures correct voltage levels for safety and proper functioning.
  - **Luminosity Test:** Measures light output for desired illumination.
  - **Functionality Test:** Verifies switches, dimmers, and timers work as intended.
- **Tracing Short Circuits and Power Interruptions:**
  - **Continuity Test:** Identifies breaks in wires causing interruptions.
  - **Insulation Resistance Test:** Detects short circuits and poor insulation.
  - **Circuit Tracer:** Locates wire paths and circuit breaks.
  - **Multimeter:** Helps identify circuit disruptions and faults.
- **Tests to Ensure Wire Breakage/Leakage:**
  - **Continuity Test:** Checks for continuous current flow in wires.
  - **Insulation Resistance Test:** Identifies breaks or leakage in insulation.
  - **Megger Test:** Measures insulation resistance to detect faults.
- **Tests in Domestic Electrical Wiring:**
  - **Continuity Test:** Ensures uninterrupted current flow in circuits.
  - **Voltage Test:** Checks voltage levels for safety.
  - **Earth Continuity Test:** Verifies proper grounding.
- **Tests for Temporary Panels/DBs and Accessories:**
  - **Insulation Resistance Test:** Ensures proper insulation for safety.
  - **Earth Continuity Test:** Verifies effective grounding.
  - **Functionality Test:** Checks switches, breakers, and indicators.
  - **Load Test:** Assesses capacity to handle loads.

Say

Let's dive into a practical activity designed to enhance your skills in tracing short circuits and identifying power interruptions using essential electrical testing tools.

Activity

Tracing Short Circuits and Power Interruptions

- **Purpose:** This activity aims to provide participants with hands-on experience in effectively using electrical testing tools for locating short circuits and identifying power interruptions in electrical systems.
- **Resources Required:** Multimeter, circuit tracer, sample wiring with short circuits, sample wiring with interrupted connections.
- **Tentative Duration:** 60 Minutes
- **Procedure:**
  - **Introduction:** Begin by emphasizing the importance of quickly identifying short circuits and power interruptions for ensuring the safety and functionality of electrical systems.
  - **Tool Introduction:** Introduce the tools to be used - the multimeter and the circuit tracer. Explain their roles in the activity.
  - **Demonstration:** Offer a demonstration showcasing how each tool can be effectively utilized to trace short circuits and locate power interruptions.
  - **Hands-On Practice:** Organize participants into pairs for active engagement.
  - **Task 1:** Continuity Test
    - Provide participants with a wiring sample containing a concealed break.
    - Instruct them to utilize a multimeter in continuity mode to pinpoint the break's location.
  - **Task 2:** Insulation Resistance Test
    - Distribute a wiring sample featuring a short circuit due to inadequate insulation.
    - Guide participants through conducting an insulation resistance test to uncover the issue.
  - **Task 3:** Circuit Tracing
    - Present a more complex wiring setup with multiple paths.
    - Introduce a hidden break within one of the paths.
    - Participants should employ a circuit tracer to identify the disrupted path.
  - **Task 4:** Fault Identification with Multimeter
  - Provide a wiring sample with a fault resulting in power interruptions.
  - Participants are to utilize a multimeter to locate and identify the point of disruption.
  - **Group Discussion:** Assemble participants to discuss the challenges encountered, experiences gained, and solutions devised during each task.
  - **Summarize:** Conclude the activity by underlining the practical significance of these skills in real-world scenarios and their integral role in maintaining secure and efficient electrical systems.

Expected Outcome: Through this activity, participants will not only develop practical proficiency in utilizing tools such as multimeters and circuit tracers but also grasp the essential ability to track down short circuits and power interruptions. These skills contribute significantly to their capability to troubleshoot and rectify issues, ensuring the safety and seamless operation of electrical systems.

Exercise

Key Solutions to PHB Exercise

1) Key Considerations for Temporary LV Electrical Panel Location:

- Adequate ventilation to prevent overheating.
- Dry and clean environment to avoid moisture damage.
- Easy access for maintenance and operation.
- Away from potential hazards like water sources and flammable materials.
- Proper clearance space for safe installation and operation.

2) Importance of Proper Grounding in Temporary LV Electrical Panels:

- Ensures a safe path for fault currents to dissipate.
- Prevents electric shocks and potential hazards to personnel.
- Reduces the risk of equipment damage from voltage surges.
- Maintains system stability and prevents unwanted electrical potential.

3) Safety Measures for Connecting and Disconnecting Circuits:

- Turn off power before connecting or disconnecting.
- Use insulated tools to prevent shock.
- Wear appropriate personal protective equipment.
- Avoid standing on damp surfaces while working.
- Double-check connections and ensure tightness.

4) Hazards of Overloading Circuits in Temporary Panels:

- Overheating of wires and components.
- Risk of electrical fires.
- Tripped circuit breakers or blown fuses.
- Reduced operational efficiency.
- Potential damage to connected devices.

5) Risks of Improper Insulation or Exposed Wiring:

- Risk of electric shock to personnel.
- Possibility of short circuits or arcing.
- Increased chances of equipment damage.
- Potential for fire hazards.

6) Purpose of Continuity Test in Temporary LV Electrical Panels:

- Identifies breaks or interruptions in wiring.
- Ensures proper electrical connections.
- Verifies the integrity of conductors.
- Prevents potential operational issues and safety hazards.

Notes

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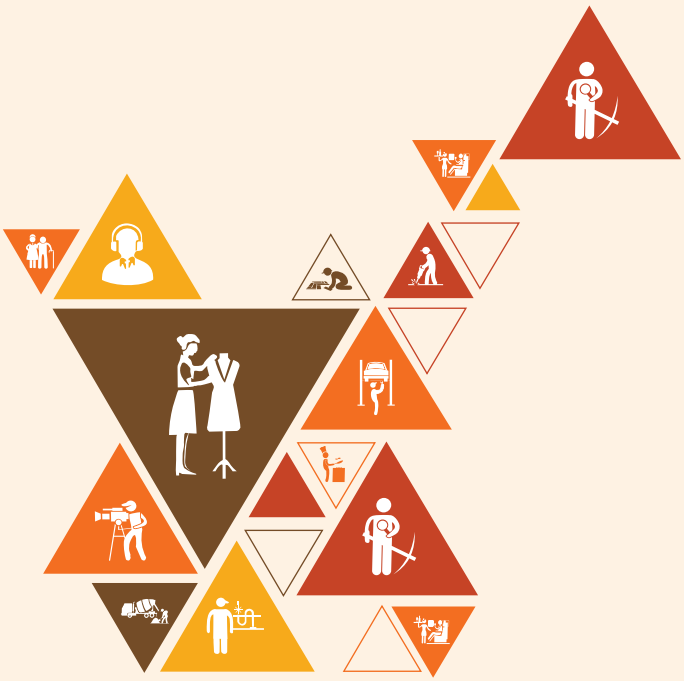
6. Team Work and Effective Communication at Workplace

Unit 6.1 - Effective Interaction & Communication



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Key Learning Outcomes

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

- Importance of interacting and communicating in an effective manner.
- Ways to support co-workers to execute the project requirements.
- Ways to practice inclusion at workplace.

Unit 6.1: Effective Interaction and Communication

Unit Objectives

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

- Elucidate own roles and responsibilities.
- Explain the importance of effective communication.
- Explain different modes of communication used at the workplace.
- Elucidate the consequence of poor teamwork on project outcomes, timelines, safety at the construction site, etc.
- Demonstrate how to pass on work-related information clearly to the team members.
- Show how to report any unresolved problem to the supervisor immediately.
- Explain the importance of creating healthy and cooperative work environment among the gangs of workers.
- Elucidate applicable techniques of work, properties of materials used, tools and tackles used, safety standards that co-workers might need as per the requirement.
- Explain the importance of proper and effective communication and the expected adverse effects in case of failure relating to quality, timeliness, safety, risks at the construction project site.
- Explain the importance and need of supporting co-workers facing problems for the smooth functioning of work.
- Demonstrate ways to hand over the required material, tools, tackles, equipment and work fronts timely to interfacing teams.
- Demonstrate ways to work together with co-workers in a synchronized manner.
- Discuss the fundamental concept of gender equality.
- Explain how to recognise and be sensitive to issues of disability culture and gender.
- Discuss legislation, policies, and procedures relating to gender sensitivity and cultural diversity including their impact on the area of operation.
- Demonstrate effective implementation of gender-neutral practices at the workplace.
- Demonstrate ways to address discriminatory and offensive behaviour in a professional manner as per organizational policy.

Resources to be used

- **Theory**
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
  - Charts/props related to topic, if any

Do

- Explain the effective communication and its need in personal & professional life.
- Enlist different modes of communication used at the workplace.
- Explain the consequence of poor teamwork on project outcomes, timelines, safety at the construction site, etc.
- Demonstrate how to pass on work-related information/requirements clearly to the team members.
- Demonstrate how to report any unresolved problem to the supervisor immediately.
- Explain the importance of creating healthy and cooperative work environment among the gangs of workers.
- Elucidate applicable techniques of work, properties of materials used, tools and tackles used, safety standards that co-workers might need as per the requirement.
- Explain the importance of proper and effective communication and the expected adverse effects in case of failure relating to quality, timeliness, safety, risks at the construction project site.
- Explain the importance and need of supporting co-workers facing problems for the smooth functioning of work.
- Demonstrate ways to hand over the required material, tools, tackles, equipment and work fronts timely to interfacing teams.
- Demonstrate ways to work together with co-workers in a synchronized manner.
- Explain the fundamental concept of gender equality.
- Explain how to recognise and be sensitive to issues of disability culture and gender.
- Enlist legislation, policies, and procedures relating to gender sensitivity and cultural diversity including their impact on the area of operation.
- Demonstrate effective implementation of gender-neutral practices at the workplace.
- Demonstrate ways to address discriminatory and offensive behaviour in a professional manner as per organizational policy.

Notes for facilitation

- Use the **Assistant Electrician** PHB and refer unit 6.1 of Effective Interaction and Communication for **Assistant Electrician**.
- Effective communication is crucial in **Assistant Electrician** and any workplace. Clear and open communication fosters collaboration, minimizes misunderstandings, and enhances productivity. In work or projects, it ensures that team members understand project goals, specifications, and

timelines accurately. Good communication also facilitates problem-solving and decision-making by enabling team members to share ideas, raise concerns, and provide feedback.

- There are various modes of communication used in the workplace, including:
  - **Verbal Communication:** This involves spoken words and can take the form of face-to-face conversations, team meetings, or phone calls.
  - **Written Communication:** This includes emails, memos, reports, and project documentation. Written communication ensures a clear record of information exchange.
  - **Visual Communication:** Visual aids like diagrams, sketches, and drawings can help convey complex information quickly, especially in tasks like illustrating tile layouts.
  - **Nonverbal Communication:** Body language, gestures, and facial expressions also play a role in conveying information and emotions.
  - **Digital Communication Tools:** Instant messaging, video conferencing, and project management software can facilitate remote collaboration and quick information sharing.
- Consequences of Poor Teamwork: Poor teamwork can have significant negative consequences on **Assistant Electrician** projects:
  - **Project Outcomes:** Incomplete or subpar work due to miscommunication or lack of coordination can lead to unsatisfactory work/installations.
  - **Timelines:** Delays may occur if team members fail to work together efficiently or if tasks are not coordinated.
  - **Safety at the Construction Site:** Miscommunication and lack of teamwork can compromise safety, leading to accidents and injuries.
- Passing on Work-Related Information: To pass on work-related information clearly to team members:
  - **Use Clear Language:** Use simple and concise language to convey instructions, requirements, and expectations.
  - **Provide Visual Aids:** Use diagrams or sketches to illustrate complex concepts like tile patterns or layout designs.
  - **Repeat Important Details:** Reinforce crucial information by repeating it verbally and in writing.
  - **Allow for Questions:** Encourage team members to ask questions if they need clarification.
- Reporting Unresolved Problems: If you encounter an unresolved problem on a **Assistant Electrician** project:
  - **Document the Issue:** Note down the problem, its impact, and any attempts you've made to address it.
  - **Notify Supervisor:** Inform your supervisor immediately about the issue. Provide them with the documented details.
  - Offer Solutions: If possible, suggest potential solutions or strategies to mitigate the problem.
  - Collaborate: Work with your supervisor and team to collectively address and resolve the

problem.

- In **Assistant Electrician**, a cooperative work environment among gangs of workers is crucial for several reasons:
    - **Efficiency:** A cooperative environment promotes efficient task execution as workers can collaborate seamlessly, share responsibilities, and assist each other.
    - **Quality:** Collaboration and communication lead to consistent work quality as experienced workers can guide and mentor those with less experience.
    - **Morale:** A positive atmosphere fosters higher morale and job satisfaction, reducing stress and turnover rates.
    - **Safety:** Workers are more likely to adhere to safety protocols when they feel supported and responsible for one another's well-being.
    - **Problem Solving:** A cooperative environment encourages open discussion and creative problem-solving, leading to better solutions.
- Supporting colleagues facing problems is essential for the smooth functioning of **Assistant Electrician** projects:
    - **Productivity:** Addressing issues promptly prevents delays caused by unresolved problems that could affect the overall project timeline.
    - **Team Spirit:** Demonstrating support enhances team morale, trust, and camaraderie, leading to improved cooperation and communication.
    - **Skill Enhancement:** Assisting struggling co-workers improves their skills, contributing to their personal growth and overall team competence.
- Ways to Hand Over Materials and Tools Timely:
    - **Planning:** Ensure that materials, tools, tackles, and equipment are scheduled for delivery well in advance to avoid last-minute shortages.
    - **Communication:** Maintain clear communication channels with interfacing teams to provide them with accurate information about what they'll receive and when.
    - **Checklists:** Create checklists of required items for each team and verify that everything is in order before handing them over.
    - Physical Organization: Store materials and tools in an organized manner, making it easy to access and distribute them as needed.
- Working Together in a Synchronized Manner:
    - **Clear Roles:** Define roles and responsibilities clearly within the team, ensuring everyone knows their tasks and areas of expertise.
    - **Communication:** Maintain constant communication among team members to coordinate efforts, share progress, and address any challenges.
    - **Regular Meetings:** Conduct regular team meetings to discuss plans, goals, and strategies. This ensures everyone is on the same page.
    - **Time Management:** Coordinate work schedules to ensure different tasks align and work can

progress without unnecessary waiting.

- **Adaptability:** Be open to adjusting plans based on changing circumstances, and encourage team members to provide input and suggest improvements.

- Gender equality refers to the equal treatment and opportunities for all genders, regardless of their perceived or assigned roles in society. In **Assistant Electrician**, it means that both men and women should have the same rights, opportunities, and responsibilities. This includes fair representation, equal pay for equal work, and the elimination of gender-based discrimination and stereotypes.
- Effective Implementation of Gender-Neutral Practices:
  - **Language Usage:** Use gender-neutral language in communication, such as using "they/them" pronouns when appropriate, to ensure inclusivity.
  - **Uniforms and Attire:** Ensure that dress codes and uniform requirements do not reinforce gender stereotypes and are inclusive of diverse gender expressions.
  - **Restroom Facilities:** Provide gender-neutral restroom facilities to accommodate individuals of all gender identities comfortably.
  - **Training and Awareness:** Conduct training sessions to raise awareness about gender diversity and sensitivity, helping to foster a more inclusive work environment.
- Addressing Discriminatory and Offensive Behaviour:
  - **Stay Calm:** If you witness or experience discriminatory or offensive behavior, remain composed and composed when addressing the issue.
  - **Private Conversation:** If possible, address the person privately to discuss their behavior and explain how it was offensive or inappropriate.
  - **Refer to Policies:** If the behavior continues, refer to the organization's policies on discrimination or harassment and report the incident to the appropriate authority.
  - **Seek Mediation:** If necessary, involve a supervisor, manager, or HR representative to mediate the situation and find a resolution.
  - **Documentation:** Keep a record of the incident, including dates, times, individuals involved, and the steps you've taken to address the issue.

Activity-1

Effective communication and team work

Conduct a role play activity.

- Procure tools, equipment and materials for said work
- Ask the participants to assemble at a designated place.
- Distribute the 'Practical Activity Format' which includes task, duration allowed, specific instructions, method statements, etc.

- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.
- Maximum duration mentioned in the below table is for extensive practice and corresponding guidance until the skill is acquired by the participants.
- Explain the roles to each of them.
- Rotate the roles after completing one cycle.

Sub Activity	Skill Practice	Time	Resources
1	Read and understand the reporting procedure	3 Hours	Pen, Paper, Sample reporting procedure
2	Communicate with the co-worker	6 Hours	
3	Report the situation to the superior	3 Hours	
4	Prepare a report accordingly	3 Hours	

Table 6.1.1 – Effective communication and team work

Specific Instructions

- Select three persons from the group.
- Explain the role play that will be enacted.
- Consider Person "A" to be a **Assistant Electrician** and Person "B" as Co-worker and Person C as the Superior.
- Ask the Person A to read and understand the reporting procedure, tell him to convey the hazard to Person B, report the situation to Person C and prepare a report on the same.
- Guide the persons in enacting the role play, indulge wherever required.
- Finish the activity within the time allotted.
- Ask the group to explain, what they have learnt from the role play? clarify any doubts.

Exercise

Key Solutions to PHB Exercise

1) To ensure effective communication with team members in a work or project, I would conduct regular meetings to discuss project goals, roles, and responsibilities. Clear written instructions and job briefings would be provided, and I'd encourage open discussions for any clarifications. Feedback loops would be established to address questions or concerns promptly.

2) In a situation where miscommunication led to a problem on a work or job, such as incorrect tile placement, I would prevent such issues by implementing a standardized communication process. This would involve written instructions, diagrams, and visual aids to ensure everyone understands the project requirements thoroughly, reducing the chances of misinterpretation.

3) Active listening in a team setting is crucial as it ensures that all team members understand their tasks and any potential challenges. It fosters clear communication and helps address concerns or ideas effectively. By actively listening to team members, a work or project can benefit from diverse perspectives, leading to more informed decisions and successful completion.

4) To maintain discipline and ensure a safe work environment while work or on-site, I would ensure all team members follow safety protocols, wear appropriate personal protective equipment (PPE), and use proper tools and equipment. Regular safety briefings, hazard assessments, and reporting mechanisms for unsafe conditions would be established to prioritize safety.

5) Encouraging and supporting diversity in a team is vital for creating a positive and inclusive work environment. I would value each team member's unique strengths and perspectives, promote open dialogue, and ensure equal opportunities for all. Recognizing and celebrating differences can lead to better problem-solving and collaboration on a work or job site.

Notes

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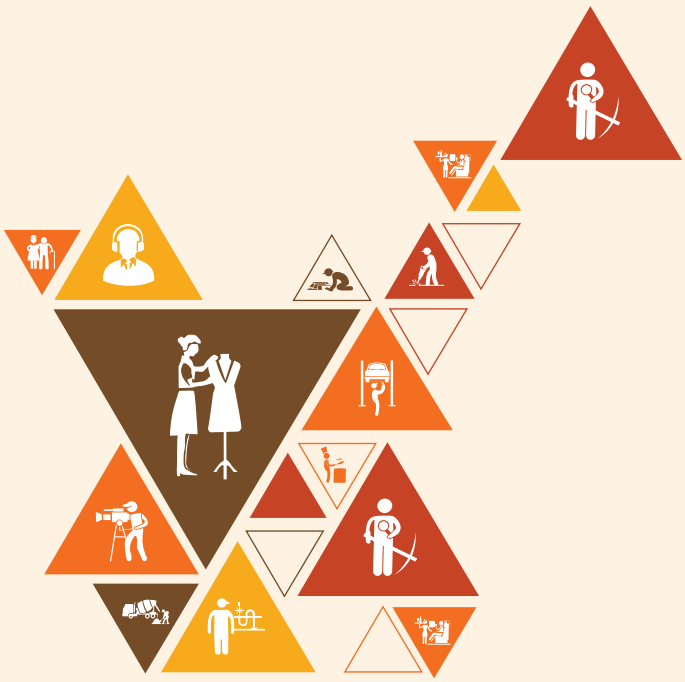
N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape

Construction Skill Development Council

7. Plan and organize work to meet expected outcomes

Unit 7.1 - Planning and Organizing Work to meet the Expected Outcomes



CON/N8002

Key Learning Outcomes

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

- Learn the importance of time;
- Plan activities and schedules;
- Learn the importance of targets and time lines set by supervisors;
- Prioritise tasks to achieve desired results;
- Plan desired resources prior to commencement of work;
- Identify and organise resources prior to commencement of work;
- Organise correct tools and materials for completion of work; and
- Use and engage resources and manpower in appropriate manner.

UNIT 7.1: Planning and Organizing Work to meet the Expected Outcomes

Unit Objectives

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

- Explain methods to upkeep, store and stack tools, materials used for domain specific works.
- Explain the process of planning of the given tasks and activities relevant to the trade/job role within defined scope and duration.
- Explain the procedure adopted for prioritizing an activity and sequencing of activities.
- Explain the work plan and flow of activities in sequence for the assigned work.
- Explain basic concept of labour productivity and work productivity.
- Explain requisition of resources, reporting for requirement of resources orally and in written to concerned authority.
- Explain how to minimise wastage of resources.
- Explain the plan for waste collection and disposal after task.
- Identify the work target and plan activities to achieve the desired productivity.
- Demonstrate requisition of resource citing an example.
- Demonstrate the planning for various activities relevant to task as per the scope and schedule.
- Demonstrate how to organise the required tool, manpower and material resources for the assigned task.
- Select required quantity of materials, tools or devices for defined work activities.
- Demonstrate how to prioritize all works/ activities to maximise output.
- Demonstrate optimum use of resources while performing domain specific work activities.
- Demonstrate waste collection and disposal as per organisational norms.
- Demonstrate completion of work within stipulated time and plan.

Resources to be used

- **Theory**
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
  - Charts/props related to topic, if any

Do

- Explain methods to upkeep, store and stack tools, materials used for domain specific works.
- Explain the process of planning of the given tasks and activities relevant to the trade/job role within defined scope and duration.
- Explain the procedure adopted for prioritizing an activity and sequencing of activities.
- Explain the work plan and flow of activities in sequence for the assigned work.
- Explain basic concept of labour productivity and work productivity.
- Explain requisition of resources, reporting for requirement of resources orally and in written to concerned authority.
- Explain how to minimise wastage of resources.
- Explain the plan for waste collection and disposal after task.
- Identify the work target and plan activities to achieve the desired productivity.

Notes for facilitation

- Use the **Assistant Electrician** PHB and refer unit 7.1 to explain the importance of Prioritizing Work Activities to achieve Desired Results for **Assistant Electrician**.
- **Methods to Upkeep, Store, and Stack Tools and Materials:**
  - Regular cleaning and maintenance of tools and equipment.
  - Proper storage in designated areas to prevent damage.
  - Stacking materials safely to avoid deterioration.
- **Process of Planning Tasks and Activities:**
  - Identify tasks and define scope and objectives.
  - Determine required resources, timeline, and sequence of activities.
  - Allocate responsibilities and set milestones.
- **Procedure for Prioritizing and Sequencing Activities:**
  - Evaluate tasks based on urgency and importance.
  - Arrange tasks in a logical sequence for efficient workflow.
- **Work Plan and Flow of Activities:**
  - Define task objectives and break down steps.
  - Allocate resources and schedule activities.
  - Sequence tasks for a logical progression.

- **Basic Concept of Labour Productivity and Work Productivity:**
  - Labour productivity: Output produced per worker's input.
  - Work productivity: Efficiency of completing tasks with available resources.
- **Requisition of Resources and Reporting:**
  - Verbally or in writing, communicate resource needs to relevant authority.
- **Minimizing Resource Wastage:**
  - Efficient use of materials and tools to reduce waste.
  - Proper storage and handling to prevent damage.
- **Plan for Waste Collection and Disposal:**
  - Organize waste collection bins and disposal methods.
  - Follow organizational guidelines for safe disposal.
- **Identifying Work Target and Planning for Desired Productivity:**
  - Set achievable goals and develop a plan to meet targets.
  - Allocate resources effectively to ensure productivity.
- **Demonstrating Requisition of Resources:**
  - Provide an example scenario of requesting necessary tools or materials.
- **Demonstrating Planning for Activities:**
  - Present a scenario where tasks are planned with scope and schedule.
- **Organizing Required Resources for Tasks:**
  - Illustrate how to gather manpower, tools, and materials for a task.
- **Selecting Required Quantity of Materials and Tools:**
  - Explain the process of determining the right amount of resources for a task.
- **Demonstrating Prioritization of Work:**
  - Show how to arrange tasks to achieve maximum output.
- **Optimum Use of Resources in Specific Work Activities:**
  - Demonstrate using resources efficiently to achieve desired results.
- **Demonstrating Waste Collection and Disposal:**
  - Illustrate following proper procedures for waste management.
- **Demonstrating Timely Completion of Work:**
  - Show completing a task within the planned timeframe while following the schedule.

Say

Let's engage in a practical activity tailored to the role of an **Assistant Electrician**. This activity will focus on the process of planning tasks and activities, as well as the procedure for prioritizing and sequencing these tasks to ensure an organized and efficient workflow.

Activity

Planning and Prioritizing Electrical Tasks

- **Purpose:** This activity aims to provide **Assistant Electrician**s with hands-on experience in effectively planning, prioritizing, and sequencing tasks to optimize their work processes.
- **Resources Required:** Task scenarios related to electrical work, markers, flip charts.
- **Tentative Duration:** 60 Minutes
- **Procedure:**
  - **Introduction:** Begin by discussing the significance of strategic planning and prioritization in the role of an Assistant Electrician.
  - **Task Identification and Definition:**
    - Distribute task scenarios related to electrical work to participants.
    - Individually or in pairs, participants analyze the scenarios and define the scope, objectives, and outcomes for each task.
  - **Resource Determination and Timeline Setting:**
    - Provide markers and flip charts.
    - Participants list the necessary resources (tools, materials, colleagues' assistance) required for each task.
    - They set realistic timelines for the completion of each task.
  - **Activity Sequence and Milestones:**
    - Divide participants into small groups.
    - Each group collaborates to arrange the tasks from their members in a logical sequence.
    - They discuss and set milestones to track their progress.
  - **Task Evaluation - Urgency and Importance:**
    - Introduce the concepts of urgency and importance.
    - Participants evaluate their tasks individually using these criteria.
    - They mark tasks on a matrix to categorize them as urgent and important, urgent but less important, important but not urgent, or neither.

- **Prioritization and Sequencing:**
  - Within their groups, participants share their evaluated tasks and collectively prioritize them.
  - They rearrange the tasks based on priority, ensuring a streamlined workflow.
  - Presentation and Discussion:
  - Each group presents their planned task sequence and discusses their prioritization decisions.
  - Facilitate a discussion about different strategies used for sequencing and prioritizing tasks.
- **Reflection and Conclusion:**
  - Engage participants in a reflection on the activity's insights.
  - Summarize the importance of planned task execution and effective prioritization in optimizing work efficiency as an **Assistant Electrician**.

Expected Outcome: This activity will provide **Assistant Electrician**s with practical experience in planning, prioritizing, and sequencing tasks, enabling them to approach their work with a structured and efficient mindset.

Exercise

Key Solutions to PHB Exercise

1. SMART goal: SMART is an acronym that stands for Specific, Measurable, Achievable, Relevant, and Time-bound. A SMART goal is a well-defined objective that is clear, quantifiable, attainable, relevant to the overall goal, and has a specific timeframe for completion. SMART goals provide a structured framework for setting and achieving objectives.
2. **Benefits of material planning:**
    - **Efficiency:** Material planning ensures that the required materials are available when needed, reducing downtime and delays.
    - **Cost savings:** Accurate planning prevents overstocking or understocking, leading to cost savings and better resource utilization.
    - **Reduced waste:** Proper planning minimizes material waste due to over ordering or improper storage.
    - **Improved project management:** Material planning contributes to smoother project execution and on-time completion.
3. **Work planning:** Work planning involves creating a detailed outline of tasks, activities, timelines, and resources required to accomplish a project. It provides a roadmap for achieving project goals effectively and efficiently.
4. **Benefits of work planning:**
    - **Clarity:** Work planning provides a clear understanding of tasks, responsibilities, and timelines, reducing confusion.
    - **Efficiency:** Proper planning optimizes resource allocation and time management, resulting in increased productivity.
    - **Risk mitigation:** Planning helps identify potential challenges and allows for proactive measures to address them.
    - **Better coordination:** Work planning enhances collaboration among team members and **various stakeholders.**
    - **Measurable progress:** Clear milestones and objectives enable progress tracking and evaluation.
5. **Sequence of work for Assistant Electrician:**

Here's a concise sequence of work for an Assistant Electrician:

- **Task Identification:** Identify tasks based on project plans or work orders.
- **Resource Gathering:** Collect required tools, equipment, and materials.
- **Safety Setup:** Wear PPE, set up work area with safety measures.
- **Testing & Troubleshooting:** Test circuits, troubleshoot issues.
- **Wiring & Connection:** Install wiring, make connections.
- **Component Installation:** Install switches, outlets, panels, fixtures.
- **Circuit Testing:** Check continuity, inspect for faults.
- **Grounding:** Establish proper grounding connections.
- **Safety Checks:** Ensure no hazards, verify installation.
- **Cleanup & Maintenance:** Clean area, maintain tools.
- **Documentation:** Record completed tasks, report deviations.
- B Communicate with team members.
- **Task Completion:** Ensure work meets standards.
- **Feedback & Improvement:** Seek feedback, learn and improve.

Notes

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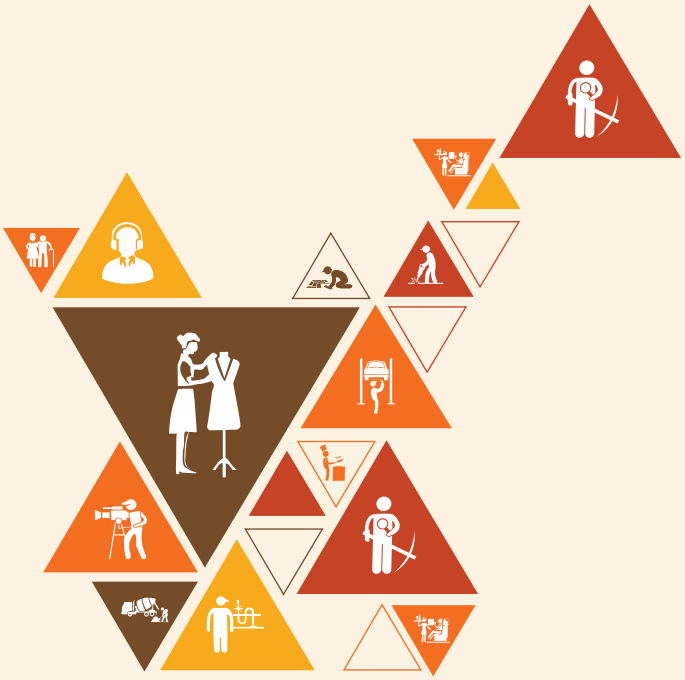
8. Maintaining a Safe, Hygienic and Secure Working Environment

Unit 8.1 – Workplace Hazards

Unit 8.2 - Fire Safety

Unit 8.3 - Safety Measures at Workplace



CON/N9001

Key Learning Outcomes

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

1. Describe the reporting procedures in cases of breaches or hazards for site safety, accidents, and emergencies as per guidelines.
2. Explain different types of safety hazards at construction sites.
3. Demonstrate how to follow emergency and evacuation procedures in case of accidents, fires, or natural calamities.
4. Discuss basic ergonomic principles as per applicability.
5. Describe the procedure for responding to accidents and other emergencies at the site.
6. Explain the importance of handling tools, equipment, and materials as per applicable norms.
7. Explain the effect of construction material on health and environments as per applicability.
8. Describe various environmental protection methods as per applicability.
9. Explain the storage requirement of waste including non-combustible scrap material and debris, combustible scrap material and debris, general construction waste and trash (non-toxic, non-hazardous), any other hazardous wastes and any other flammable wastes at the appropriate location.
10. Show how to collect, segregate and deposit construction waste into appropriate containers based on their toxicity or hazardous nature.
11. Explain how to use hazardous material in a safe and appropriate manner as per applicability.
12. Explain types of fire.
13. Describe the procedure of operating different types of fire extinguishers.
14. Show how to operate different types of fire extinguishers corresponding to various types of fires as per EHS guidelines.
15. State safety relevant to tools, tackles, and equipment as per applicability.
16. Demonstrate the use of appropriate Personal Protective Equipment (PPE) as per work requirements for Head Protection, Ear Protection, Fall Protection, Foot Protection, Face and Eye Protection, Hand and Body Protection, and Respiratory Protection (if required).
17. Demonstrate how to check and install all safety equipment as per standard guidelines.
18. List housekeeping activities relevant to the task.
19. Elucidate ways of transmission of infection Explain the ways to manage infectious risks at the workplace.
20. Describe different methods of cleaning, disinfection, sterilization, and sanitization.
21. Show how to clean and disinfect all materials, tools and supplies before and after use.
22. List the symptoms of infection like fever, cough, redness, swelling, and inflammation.

Unit 8.1: Workplace Hazards

Unit Objectives

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

1. Understand the types of hazards at the construction sites and identify the hazards specific to the domain related works.
2. Recognize the safety control measures and actions to be taken under emergency situation.
3. Know the reporting procedure to the concerned authority in case of emergency situations.

Resources to be used

- **Theory**
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
  - Leather Hand Gloves, Jump suit, Wire brush, Hand and Leg guard leather, Safety goggles, Nose mask, Ear protection, Fire extinguishers, Sand buckets Flashback arrestors, Welding helmet, Welding glass, Fire Extinguisher, Fire prevention kit, First Aid box, Safety tags and Safety Notice board.

Do

- Explain the types of hazards at the construction sites and identify the hazards specific to the domain related works.
- Reiterate about safety control measures and actions to be taken under emergency situation.
- Share reporting procedure to the concerned authority in case of emergency situations.

Notes for facilitation

- Use the **Assistant Electrician** PHB and refer unit 8.1 to explain Hazards and Emergency Situations for **Assistant Electrician**.
- Construction sites pose various hazards due to the nature of the work. These hazards can be categorized as follows:
  - Physical Hazards
  - Chemical Hazards

- Biological Hazards
- Ergonomic Hazards
- Psychosocial Hazards

- Specific Hazards in **Assistant Electrician**: In the context of **Assistant Electrician**, some hazards specific to the domain might include:
  - Tripping Hazards
  - Material Handling
  - Dust Exposure
- **Recognizing Safety Control Measures and Emergency Actions:**
  - **Safety Control Measures:** To mitigate hazards at construction sites, the following safety control measures can be taken:
    - Personal Protective Equipment (PPE).
    - **Training:** Ensure workers are trained in proper handling of tools, equipment, and materials to prevent accidents.
    - Safe Work Practices.
    - Ventilation and Dust Control.
  - **Emergency Actions:** In case of emergency situations at the construction site, follow these actions:
    - Evacuation.
    - First Aid.
    - Emergency Contacts.
  - **Reporting Procedures in Emergency Situations:**
    - **Internal Communication:** Notify your immediate supervisor or project manager about the emergency situation.
    - **Established Protocol:** Follow the organization's established protocol for reporting emergencies, including specific contact persons or numbers.
    - **Documentation:** If safe to do so, document the details of the emergency, including the time, location, nature of the incident, and any injuries.
    - **Cooperate with Authorities:** Provide accurate information to emergency responders and cooperate with their instructions.

Notes

Unit 8.2: Fire Safety

Unit Objectives

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

1. Explain the classes of fire and types of fire extinguishers.
2. Demonstrate the operating procedure of the fire extinguishers.
3. Explain the importance of participation of workers in safety drills.
4. List out basic medical tests required for working at construction site.
5. Explain the purpose and importance of vertigo test at construction site.
6. Explain the types and benefits of basic ergonomic principles, which should be adopted while carrying out specific task at the construction sites.
7. Demonstrate use of PPEs as per work requirements.

Resources to be used

- **Theory**
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
  - Leather Hand Gloves, Jump suit, Wire brush, Hand and Leg guard leather, Safety goggles, Nose mask, Ear protection, Fire extinguishers, Sand buckets Flashback arrestors, Welding helmet, Welding glass, Fire Extinguisher, Fire prevention kit, First Aid box, Safety tags and Safety Notice board.

Do

- Explain the classes of fire and types of fire extinguishers.
- Demonstrate the operating procedure of the fire extinguishers.
- Explain the importance of participation of workers in safety drills.
- Enlist basic medical tests required for working at construction site.
- Explain the purpose and importance of vertigo test at construction site.
- Explain the types and benefits of basic ergonomic principles, which should be adopted while carrying out specific task at the construction sites.
- Demonstrate use of PPEs as per work requirements.

Notes for facilitation

- Use the **Assistant Electrician** PHB and refer unit 8.2 to explain Safety Drills, PPEs and Fire Safety for **Assistant Electrician**.
- **Classes of Fire:** Fires are classified into different classes based on the type of fuel involved:
  - **Class A:** Fires involving common combustible materials like wood, paper, and cloth.
  - **Class B:** Fires involving flammable liquids, gases, or greases.
  - **Class C:** Fires involving energized electrical equipment.
  - **Class D:** Fires involving combustible metals.
  - **Class K:** Fires involving cooking oils and fats, commonly found in kitchens.
- **Types of Fire Extinguishers:** Different types of fire extinguishers are designed to handle specific classes of fire:
  - **Water Extinguishers (Class A):** Suitable for Class A fires, but not for fires involving flammable liquids or electrical equipment.
  - **Foam Extinguishers (Class A and B):** Effective on Class A and B fires, but not for electrical fires.
  - **Dry Powder Extinguishers (Class A, B, C, and D):** Suitable for a range of fires, including electrical fires and flammable liquids.
  - **CO2 Extinguishers (Class B and Electrical Fires):** Effective for flammable liquid and electrical fires, but not for Class A fires.
  - **Wet Chemical Extinguishers (Class K):** Specifically designed for kitchen fires involving cooking oils and fats.
- **Operating Procedure of Fire Extinguishers:**
  - **Pull:** Pull the pin to break the seal and unlock the operating lever.
  - **Aim:** Aim the nozzle at the base of the fire where the fuel source is.
  - **Squeeze:** Squeeze the operating lever to release the extinguishing agent.
  - **Sweep:** Sweep the nozzle from side to side while directing the agent at the base of the fire until it's extinguished.
- **Importance of Participation in Safety Drills:** Participation in safety drills is important for several reasons:
  - **Familiarity:** Workers become familiar with evacuation routes and emergency procedures.
  - **Response Practice:** Workers practice how to respond to emergencies, minimizing confusion during real incidents.
  - **Efficiency:** Regular drills improve the efficiency of evacuation and emergency response.

- **Identification of Weaknesses:** Drills help identify areas that need improvement in the emergency plan.

- **Basic Medical Tests Required for Construction Site:** Common medical tests for construction site workers include:
  - **Physical Examination:** Overall health assessment.
  - **Vision and Hearing Tests:** Ensuring good visual and auditory health.
  - **Lung Function Test:** Assessing respiratory health.
  - **Blood Pressure and Heart Rate Check:** Monitoring cardiovascular health.
- **Purpose and Importance of Vertigo Test:** A vertigo test assesses a worker's balance and susceptibility to dizziness, which is crucial for working at heights. Vertigo can lead to accidents and falls, making this test vital for maintaining site safety.
- **Types and Benefits of Basic Ergonomic Principles:** Ergonomic principles for construction tasks include proper lifting techniques, maintaining neutral body positions, and using suitable tools. Benefits include reducing strain, preventing musculoskeletal injuries, and enhancing overall worker well-being.
- **Demonstrating Use of PPEs:** Proper PPE usage involves:
  - **Selection:** Choose the appropriate PPE for the task.
  - **Fitting:** Ensure PPE fits correctly and comfortably.
  - **Wearing:** Wear PPE consistently throughout the task.
  - **Adjusting:** Make necessary adjustments for comfort and effectiveness.
  - **Maintaining:** Regularly inspect and maintain PPE to ensure it functions properly.
- Using PPE correctly safeguards workers from potential hazards like head injuries, respiratory issues, and more, contributing to a safer work environment in **Assistant Electrician**.

Activity-1

Conduct a role play activity on following emergency procedure in case of accidental fire at work place.

- Ask the participants to assemble at a designated place.
- Distribute the 'Practical Activity Format' which includes task, duration allowed, specific instructions, method statements, etc.
- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.

- Ask two persons who are very much interactive to participate in the role play.
- Explain the roles to each of them.
- Rotate the roles after completing one cycle.

Sub Activity	Time	Resources
Start the fire alarm	1 hour	Stationary items, Fire extinguisher, wood and paper pieces, match box
Use fire extinguisher	6 hours	
Call for medical help and carryout primary first aid for the injured person	2 hours	
Instruct co-workers to gather at the collection point	2 hours	

Table 8.2.1 – General safety at a construction site

Specific Instructions

- Select four persons from the group.
- Name the persons selected as Peron A, B, C and D.
- Explain and demonstrate the method to perform the sub activities.
- Consider Person A to be a **Assistant Electrician** and the rest are co-workers.
- Start the role play and check whether it is happening as per the plan.
- Guide closely wherever needed.
- Complete the activity as per scheduled time.
- Ask the watching group to explain the steps that are performed.
- Clarify doubts, if any.

Activity-2

Working at Heights

Conduct a skill practice activity on using ladder safely at heights with proper PPE.

- Ask the participants to assemble at a designated place.

- Distribute the 'Practical Activity Format' which includes task, duration allowed, specific instructions, method statements, etc.
- List and explain the safety guidelines followed at heights.
- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.
- Maximum duration mentioned in the below table is for extensive practice and corresponding guidance until the skill is acquired by the participants.

Sub Activity	Time	Resources
Practice wearing PPE	2 hours	Ladder, PPE
Erect the ladder	2 hours	
Practice climbing the ladder safely	2 hours	

Table 8.2.2 – Working at heights

Specific Instructions

- Show the PPE matrix that has to be followed at a construction site.
- Demonstrate the standard procedure for wearing the PPE.
- Demonstrate the important checks that are to be performed while erecting the ladder.
- Ask the participants to practice wearing PPE, check and ensure that there is no deviation of standard procedure.
- Ask the participant to practice using ladder.
- Guide and correct the participants wherever necessary.
- List the advantages of using PPE.
- Clarify doubts, if any.

Notes

Unit 8.3: Safety Measures at Workplace

Unit Objectives

1. **After the end of this unit, participants will be able to:**
2. Follow the practices to maintain personal hygiene, workplace hygiene and site/ workplace sanitization
3. Understand the importance of housekeeping works
4. Keep an eye on safe housekeeping practices
5. Understand different types of waste at construction sites and their disposal method
6. Know safe waste disposal practices followed at construction site
7. Know different types of infectious disease that can spread/ originate at a construction site
8. Understand the ways of transmission of the various infectious disease.
9. Recognize the methods to check the spread of the infectious disease.
10. Understand the symptoms and cure of the various infectious disease.
11. Apprehend the procedure to report to the concerned authority regarding the outbreak/ hazard of any infectious disease/ pandemic.

Resources to be used

- **Theory**
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
  - Leather Hand Gloves, Jump suit, Wire brush, Hand and Leg guard leather, Safety goggles, Nose mask, Ear protection, Fire extinguishers, Sand buckets Flashback arrestors, Welding helmet, Welding glass, Fire Extinguisher, Fire prevention kit, First Aid box, Safety tags and Safety Notice board.

Do

- Explain the practices to maintain personal hygiene, workplace hygiene and site/ workplace sanitization
- Describe the importance of housekeeping works
- Discuss the safe housekeeping practices and ask them to follow
- Explain different types of waste at construction sites and their disposal method
- Explain safe waste disposal practices followed at construction site
- Clarify different types of infectious disease that can spread/ originate at a construction site
- Explain the ways of transmission of the various infectious disease.

- Mention the methods to check the spread of the infectious disease.
- Explain the symptoms and cure of the various infectious disease.
- Apprehend the procedure to report to the concerned authority regarding the outbreak/ hazard of any infectious disease/ pandemic.

Notes for facilitation

- Use the **Assistant Electrician** PHB and refer unit 8.3 to explain Hygiene and Safe Waste Disposal Practices for **Assistant Electrician**.
- Personal Hygiene: Maintaining personal hygiene involves practices such as washing hands before and after work, wearing clean and appropriate clothing, and using personal protective equipment (PPE) to prevent contamination and protect oneself from hazards.
- Workplace Hygiene: Workplace hygiene includes keeping work areas clean, organized, and free from hazards. Regular cleaning of tools, equipment, and surfaces helps prevent accidents, maintain efficiency, and promote a healthy work environment.
- Site Sanitization: Site sanitization involves cleaning and disinfecting shared areas to prevent the spread of germs and ensure a safe working environment. This is especially important in light of health concerns and global events.
- **Importance of Housekeeping Works:** Housekeeping works are crucial in the construction industry for several reasons:
    - **Safety:** A clean and organized workspace reduces the risk of slips, trips, falls, and other accidents.
    - **Efficiency:** Proper organization of tools, materials, and equipment improves work efficiency.
    - **Prevention:** Regular cleaning prevents the buildup of dust, debris, and potential fire hazards.
    - **Morale:** A clean and organized work environment boosts worker morale and job satisfaction.
- **Safe Housekeeping Practices:**
    - **Daily Clean-up:** Clean-up work areas at the end of each day to ensure a fresh start the next day.
    - **Tool Storage:** Properly store tools, equipment, and materials after use to prevent tripping hazards and damage.
    - **Waste Disposal:** Dispose of waste properly and promptly to prevent clutter and hygiene issues.
- **Different Types of Waste at Construction Sites and Their Disposal:**
    - **General Waste:** Regular construction debris like paper, packaging, and non-hazardous materials.
    - **Hazardous Waste:** Includes chemicals, solvents, paints, and materials that pose health or

environmental risks.

- **Electronic Waste:** Old or broken electronic equipment, requiring proper disposal due to environmental concerns.

- **Safe Waste Disposal Practices at Construction Site:**
  - **Separation:** Segregate waste into different categories for appropriate disposal.
  - **Labeling:** Clearly label hazardous waste containers to prevent accidents.
  - **Storage:** Store waste in designated areas to avoid contamination and health hazards.
  - **Legal Compliance:** Follow local regulations and guidelines for waste disposal.
- Maintaining personal and workplace hygiene, implementing proper housekeeping practices, and ensuring safe waste disposal contribute to a safer and more organized construction site environment, benefitting both workers and the overall project.
- **Infectious diseases that can spread or originate at construction sites include:**
  - **Respiratory Infections:** Such as the flu, common cold, and COVID-19.
  - **Skin Infections:** Like bacterial infections, fungal infections, and rashes.
  - **Gastrointestinal Infections:** Including foodborne illnesses due to poor hygiene.
  - **Vector-Borne Diseases:** Like mosquito-borne diseases (e.g., Zika, dengue) due to stagnant water.
- **Ways of Transmission of Infectious Diseases:**
  - **Airborne Transmission:** Respiratory infections can spread through respiratory droplets released when an infected person coughs, sneezes, or talks.
  - **Direct Contact:** Skin infections can be transmitted through direct skin-to-skin contact or contact with contaminated surfaces.
  - **Fecal-Oral Route:** Gastrointestinal infections can spread through contaminated food, water, or surfaces.
  - **Vector-Borne Transmission:** Insects like mosquitoes can carry and transmit diseases from person to person.
- **Methods to Check the Spread of Infectious Diseases:**
  - **Hand Hygiene:** Regularly washing hands with soap and water or using hand sanitizers.
  - **Respiratory Hygiene:** Covering mouth and nose when coughing or sneezing.
  - **Personal Protective Equipment (PPE):** Wearing appropriate PPE like masks and gloves.
  - **Disinfection:** Regularly cleaning and disinfecting surfaces and shared equipment.
- **Understanding Symptoms and Cure of Infectious Diseases:**
  - ofluids, and in severe cases, medical attention.

- **Skin Infections:** Symptoms include redness, swelling, itching, and rashes. Treatment depends on the type of infection and may involve antibiotics or antifungal medications.
- **Gastrointestinal Infections:** Symptoms include nausea, vomiting, diarrhea, and abdominal pain. Treatment involves staying hydrated and in severe cases, medical intervention.
- **Vector-Borne Diseases:** Symptoms vary based on the disease. Treatment ranges from supportive care to specific antiviral or antibiotic medications.

- **Reporting Infectious Disease Outbreaks to Concerned Authorities:**
  - **Immediate Reporting:** If an infectious disease outbreak is suspected, immediately inform your supervisor, manager, or the designated health and safety personnel.
  - **Follow Protocols:** Follow the organization's protocols for reporting infectious diseases or pandemics, including informing co-workers who may have been exposed.
- **Health Authorities:** If necessary, local health authorities should be contacted to ensure proper containment and response.

Activity-1

Safe Disposal of Waste

Conduct a role play activity.

- Ask the participants to assemble at a designated place.
- Distribute the 'Practical Activity Format' which includes task, duration allowed, specific instructions, method statements, etc.
- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.
- Ask two persons who are very much interactive to participate in the role play.
- Explain the roles to each of them.
- Rotate the roles after completing one cycle.

Sub Activity	Time	Resources
Practice wearing PPE	1 hour	Waste containers, masonry pan, sample construction waste
Segregate the Wastes	2 hours	
Dispose the waste in the allocated container	2 hours	

Table 8.3.1 – Safe disposal of waste

Specific Instructions

- Ensure the participants are wearing the PPE properly.
- Select two persons from the group who are effective in communication
- Consider one as helper and the other as mason, now ask the helper to deposit the waste in one location and place the containers at another location.
- Ask the mason to instruct the helper to segregate or differentiate the type of wastes
- Then ask the mason to tell the helper to transfer the segregated waste with the help of masonry pan.
- Ensure that both the persons communicate properly by giving hints in between.
- Tell them to complete the activity on the speculated time and ensure that the wastes are properly placed in the containers and it is secured properly.

Exercise

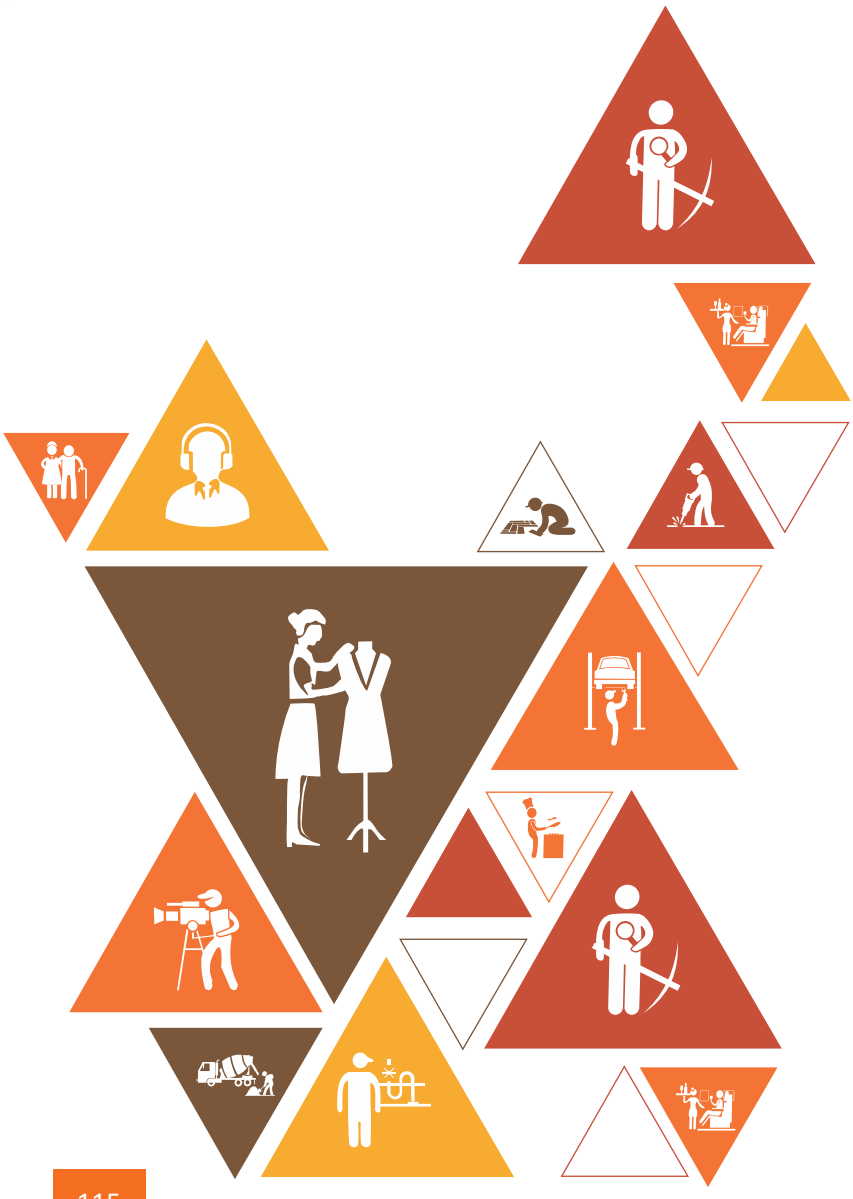
Key Solutions to PHB Exercise

1. **Types of hazards in the construction industry:**
    - **Physical Hazards:** Such as falling objects, moving machinery, noise, and vibration.
    - **Chemical Hazards:** Exposure to hazardous substances like asbestos, solvents, and toxic gases.
    - **Biological Hazards:** Exposure to pathogens and biological agents, especially in excavation and waste handling.
    - **Ergonomic Hazards:** Poor ergonomics leading to musculoskeletal disorders due to repetitive motions, lifting heavy loads, or awkward postures.
    - **Psychosocial Hazards:** Stress, long working hours, and poor work-life balance.
    - **Electrical Hazards:** Exposed wiring, faulty equipment, and potential for electric shock.
    - **Fire and Explosion Hazards:** Due to flammable materials, welding operations, or electrical faults.
2. **Key steps in handling emergencies:**
    - **Assess the Situation:** Evaluate the nature and severity of the emergency.
    - **Notify:** Immediately inform supervisors and relevant personnel.
    - **Evacuate:** If necessary, evacuate the area or site safely.
    - **Provide First Aid:** Administer first aid or call for medical help as needed.
    - **Report to Authorities:** Report the incident to relevant authorities as required.
3. **Basic principles of first aid and training:**
    - Assess the situation, ensure safety, and call for professional medical help if needed.
    - Provide CPR, if trained, to restore breathing and circulation.
    - Control bleeding, immobilize fractures, and provide comfort to the injured.
    - Training involves hands-on practice, simulations, and guidance from certified trainers.
4. **Fire safety measures at a construction site:**
    - Install and maintain fire extinguishers at strategic locations.
    - Train workers on how to use fire extinguishers properly.
    - Establish evacuation routes and assembly points.
    - Conduct regular fire drills to ensure everyone is familiar with procedures.

- Store flammable materials safely and adhere to electrical safety protocols.

5. **Importance of PPE and care practices:**
    - PPE protects workers from hazards like falling debris, chemicals, and noise.
    - Essential PPE includes helmets, safety glasses, gloves, high-visibility clothing, and respiratory protection.
    - Care involves regular inspection, cleaning, proper storage, and replacement when damaged.
6. **Implementing good housekeeping practices:**
    - Store tools and equipment properly.
    - Keep walkways clear of debris and obstacles.
    - Dispose of waste in designated containers.
    - Maintain clean and organized work areas to prevent accidents.
7. **Safe waste disposal practices:**
    - Segregate waste into different categories like hazardous, non-hazardous, and recyclable.
    - Use appropriate containers for different types of waste.
    - Dispose of hazardous waste according to regulations.
    - Implement recycling programs for materials like metal, plastic, and paper.
    - Educate workers about proper waste disposal to prevent environmental pollution and health hazards.

Notes



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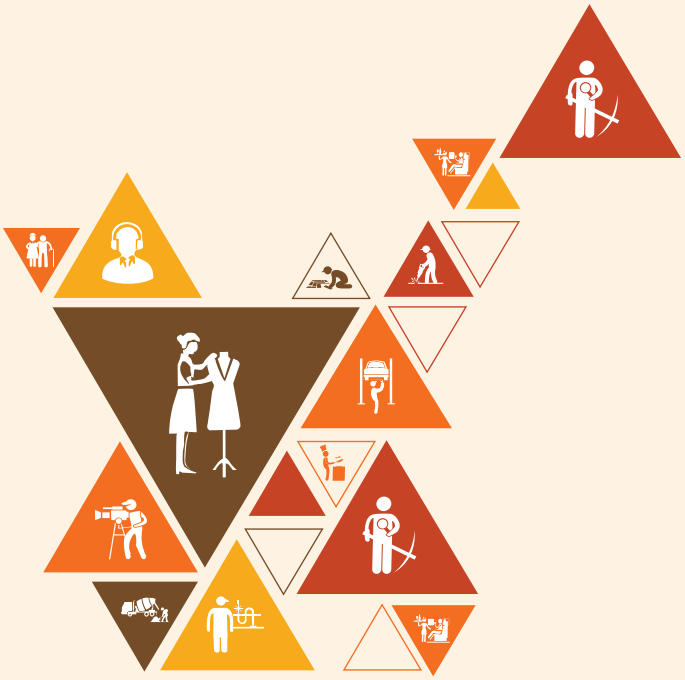
9. Employability Skills (30 Hours)

It is recommended that all trainings include the appropriate Employability skills Module. Content for the same can be accessed

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

Scan the QR code below to access the ebook



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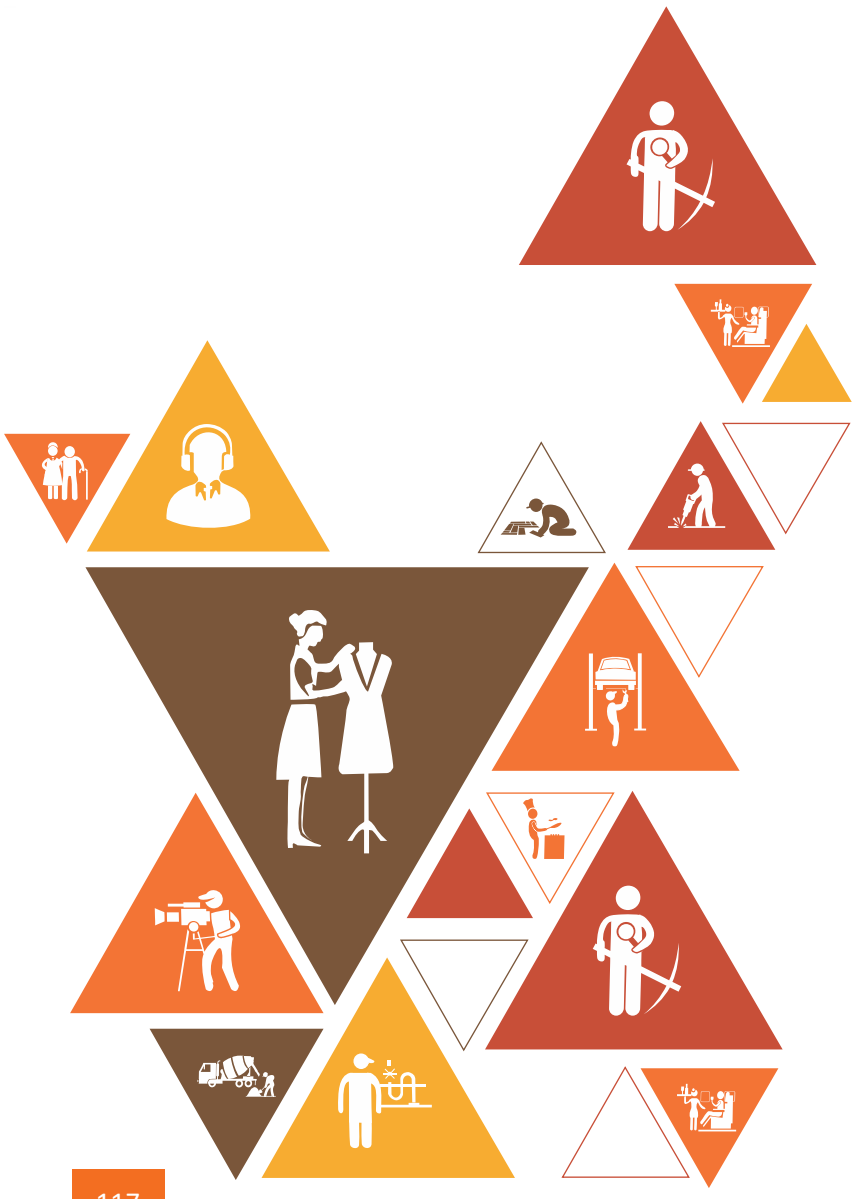

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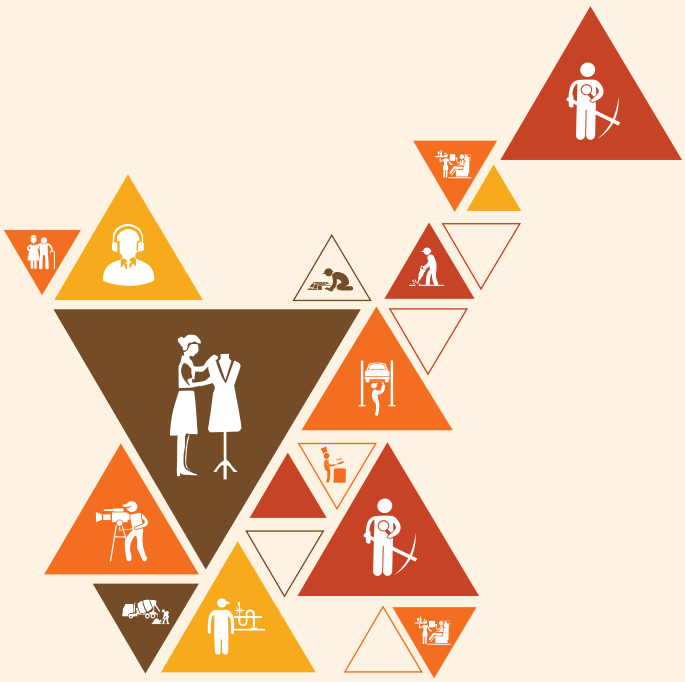
10. Annexures

Annexure I - Training Delivery Plan

Annexure II - Assessment Criteria

Annexure III - QR Codes –Video Links



Annexure I
Training Delivery Plan

Training Delivery Plan			
Program Name:	**Assistant Electrician**		
Qualification Pack Name & Ref. ID	CON/Q0314		
Version No.	2.0	**Version Update Date**	31/03/2022
Prerequisites to Training (if any)	**Minimum Educational Qualification:** 5th grade pass with 4 Years of experience relevant experience OR 8th Class pass with 1 year of (NTC/ NAC) after 8th OR 8th Class pass with 1 Year of experience relevant experience OR 9th Class pass OR No formal education prescribed (Previous relevant Qualification of NSQF Level 2) with 1 Year of experience relevant experience OR No formal education prescribed (Previous relevant Qualification of NSQF Level 2.5) with 6 Months of experience relevant experience		
Training Outcomes	**After completing this program, participants will be able to:** • Handle hand and power tools relevant to construction electrical works • Install temporary lighting arrangement at construction sites • Assist in LV (low voltage) electrical wiring at permanent structures • Assemble, install and maintain temporary LV electrical panels (distribution boards) at construction site • Work effectively in a team to deliver desired results at the workplace • Plan and organize work to meet expected outcomes • Work according to personal health, safety and environment protocols at construction site • Employability Skills		

Sl. No	Module	Unit	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools/ Aids	Duration
1	Introduction	UNIT 1.1: Introduction to training program	Purpose, Benefits of the Training Programme and Introduction to QP and NOS	Participant will be able to, • Explain the purpose of training. • Describe about National Occupation Standards and Qualification Pack.	NA	Interactive Lecture	PPT	2
		UNIT 1.2: An overview of construction sector	Introduction and modernization of construction sector	Participant will be able to, • Explain about construction sector in India. • Explain modernization construction sector in India.				2
		UNIT 1.3: Roles and responsibilities of an Assistant Electrician	Introduction to electrical works in the construction sector	Participant will be able to, • List the electrical works carried out in construction sector				2
			Roles, Responsibilities and Personal attributes of an Assistant Electrician	Participant will be able to, • State the roles and responsibilities of an Assistant Electrician				2
			Description of course content, mode of learning and duration of the course	Participant will be able to, • Explain course content, mode of learning and duration of the course				2
			Career Progression Path	Participant will be able to, • Explain the career progression path for an assistant electrician				2
		UNIT 1.4: Basic concepts of electricity	Electric current, Resistance and Effect of temperature on resistance	Participant will be able to, • Describe the principle of electric current • Explain what resistance is • Describe the relation of temperature with resistance • Describe the relation of temperature on various materials	CON/ NO602 KB7 CON/ NO603 KB15	Interactive Lecture		2

			Ohm's law, Series, parallel and combination circuits	Participant will be able to, • State ohm's law • Explain what is an electric field and its effects	CON/ NO603 KB10 KB13			2
			Ampere law, Electromag-netic field and its effect	Participant will be able to, • Explain what is an electric field and its effects • State Ampere's law	CON/ NO603 KB10			2
			Basic concept of AC and DC current generation	Participant will be able to, • Describe the basic concept of AC and DC generation	CON/ NO603 KB12			2
			LV of single and three phase connections	Participant will be able to, • Describe the basic concept LV of single phase connections • Describe the basic concept LV of three phase connections	CON/ NO603 KB11			2
2	Generic Skills	UNIT 2.1: Work effec-tively in a team	Communica-tion	Participant will be able to, • Explain the process of communication • What are oral and written communication skills • Describe the reporting procedure to a concerned authority	CON/N8 001 KA1, KA2, KA3 KA4, KA5 KB1, KB2, KB3, KB4 SA1, SA2, SA3, SA4, SA5, SA6 SB1, SB2, SB3, SB4, SB5, SB6, SB7 CON/ N8 001 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8	Interac-tive Lec-ture Role Play	PPT	8
			Read and understand the reporting procedure	Participant will be able to, • Identify the importance of reporting procedure				4
			Communi-cate with the coworker	Participant will be able to, • Effectively communicate with others				4
			Report the situation to the superior	Participant will be able to, • Carry out effective reporting procedure				4
			Prepare a report accordingly	Participant will be able to, • Prepare a report accordingly				4

		UNIT 2.2: Plan and organize work to meet expected outcome	Prioritize work and organizing resources	Participant will be able to, • Plan activities and schedules • Prioritize tasks to achieve desired results	CON/N8002 KA1, KA2,KA3 KB1, KB2	Interactive Lecture	PPT	4
			Breaking the main task into sub tasks and prioritizing work	Participant will be able to, • Prioritize the work	CON/N8002 PC1, PC2, PC3, PC4	Role Play		4
			Organize resources accordingly	Participant will be able to, • Organize man, material resources effectively	CON/ N8002 PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12	Role Play		4
3	Health and safety while performing electrical works	UNIT 3.1: General safety	General safety at construction site	Participant will be able to, • List the types of hazards involved in construction sites • Describe the safety control measures and actions to be taken under emergency situation • Explain how to classify fire and fire extinguishers • Explain how safety drills are conducted	CON/ N9001 KA2, KB1 KB4,	Interactive Lecture	PPT	8
			Start the fire alarm	Participant will be able to, • Start the fire alarm	CON/N9001 PC1, PC2, PC3, PC4, Pc7	Demonstration and practice		3
			Use fire extinguisher	Participant will be able to, • Use fire extinguisher		Demonstration and practice		6
			Call for medical help and carryout primary first aid for the injured person	Participant will be able to, • Call for medical help and carryout primary first aid for the injured person				4

			Instruct coworkers to gather at the collection point	Participant will be able to, • Instruct co-workers to gather at the collection point		Demonstration and practice		4
		UNIT 3.2: Personal health and safety	Personal safety at construction sites	Participant will be able to, • Describe the safety norms applicable in construction sites and electrical works • Explain the use of PPE's used by an assistant electrician • List the type of electrical hazards associated with domestic wiring work • Describe the effects of faulty/improper wiring works • Identify electrical hazards associated with domestic wiring	CON/ N9001 KA1, KA2, KB1, KB4	Interactive Lecture Demonstration and practice Demonstration and practice Demonstration and practice	PPT	2
			Practice wearing PPE	Participant will be able to, • Carryout procedure for using PPE			PPE, Ladder	3
			Erect the ladder	Participant will be able to, • Install the ladder as per safety norms				2
			Climb the ladder safely	Participant will be able to, • Use the ladder as per safety norms				1
		UNIT 3.3: Waste disposal	Safe disposal of waste	Participant will be able to, • Describe the standard safety control measures • Explain the importance of safe disposal of waste • Discuss about electrical waste management at a construction site	CON/ N9001 KB4, KB5, KB6, KB7, KB8, KB9	Interactive Lecture	PPT	1
			Segregation of wastes and safe disposal	Participant will be able to, • Segregate the wastes and dispose them safely	CON/ N9001 PC8, PC11, PC12	Role Play		4

4	Electrical drawings	UNIT 4.1: Wiring symbols, Single line diagram and Electrical specifications	Wiring symbols, Single line diagram and Electrical specifications	Participant will be able to, • Explain the importance of electrical drawings • List the wiring symbols • Explain the importance of interpretation of electrical specifications	CON/ N0603 KB1, KB2	Interactive Lecture	PPT	2
			Identify electrical symbols	Participant will be able to, • Identify electrical symbols	CON/ N0603 KB1	Group activity	Electrical symbols chart	1
			Identify electrical circuit/wiring diagram	Participant will be able to, • Identify electrical circuit/wiring diagram	CON/ N0603 KB2	Group activity	Electrical circuit/wiring diagram chart	1
			Interpret electrical specifications	Participant will be able to, • Read and interpret electrical specifications	CON/ N0602 KB3, SA3, SB11	Group activity	Sample electrical specifications	1
			Interpret manufacturer's guidelines	Participant will be able to, • Read and interpret manufacturer's guidelines	CON/ N0602 PC13	Group activity	Sample manufacturer' s guidelines	1
5	Select and use electrical tools, devices and materials in electrical occupation	UNIT 5.1: Introduction to electrical tools, equipment , materials, devices, conduits and fixtures	Electrical tools, equipment, materials, devices, conduits and fixtures	Participant will be able to, • List the various types of electrical hand and power tools • Describe to maintain/ store electrical tools and devices • List the various types of electrical measuring tools • Describe to maintain/ store electrical measuring tools and devices • List the various types of electrical devices used in circuits	CON/ N0602 KA1, KB3, KB10, KB5, KB13, KB17	Interactive Lecture	PPT	4

				Participant will be able to, • Describe about the various types of cables • Recall the types of conduits and fixtures • Describe how to select the right conduits and fixtures based on power rating and respective used in electrical works • List the types of electrical materials and fixtures used for domestic wiring • Explain the standard conditions for storing and stacking electrical units, materials, fixtures, tools and devices		Interactive Lecture	PPT	4
			Identify and use hand, power and measuring tools	Participant will be able to, • Identify and use hand, power and measuring tools	CON/ N0 602 PC1, PC2 PC3, PC4 PC5, PC6 PC7, PC8 PC9, PC10 PC11, PC12 PC13	Demonstration and practice	Hand, power and measuring tools	4
			Identify the electrical devices and their use in circuits.	Participant will be able to, • Identify the electrical devices and their use in circuits.		Demonstration and practice	Electrical devices	4
			Identify the different types of conduits and cables.	Participant will be able to, • Identify the different types of conduits and cables		Demonstration and practice	Conduits and cables	4
			Identify the types of lights used in construction sites.	Participant will be able to, • Identify the types of lights used in construction sites.		Demonstration and practice	Types of lights	4
			Identify earthing equipment	Participant will be able to, • Identify earthing equipment.		Demonstration and practice	Earthing equipment	3

			Organize the storage area with electrical units, materials, fixtures, tools and devices	Participant will be able to, • Organize the storage area with electrical units, materials, fixtures, tools and devices		Demonstration and practice	Electrical units, materials, fixtures, tools and devices	3
6	Temporary electrical works at construction site	UNIT 6.1: Cable laying through poles	Cable laying through poles at construction sites	• Participant will be able to, • Explain the standard practice of cable laying through poles at construction sites • Describe the method of joining cables • Explain how electrical termination is performed • Describe how to trace short circuits, power interruptions/ continuity	CON/ N0603 KB9, KB16, KB17 KB18, KB19 CON/ N0604 KA1, KA2, KA3, KA4, KA5 KB1, KB2, KB3, KB4, KB6, KB7, KB8, KB10, KB15, KB16, KB21, KB22 SA4, SA5, SA7, SA8, SB1, SB2, B3,SB4, SB5 SA4, SA5, SA7, SA8, SB1, SB2,SB3, SB4, SB5 SB6, SB7, SB8, ,SB10 , SB11, SB1 2, SB13, SB1 4, SB15, SB1 6, SB17, SB1 8	Interactive Lecture	PPT	4
				Participant will be able to, • Describe the method of fixing lights and their respective accessories • State the different types of faults associated with lighting arrangements • Explain the standard practices of cable/ wire laying through conduits • Describe steps involved in fitting a fixture in wall		Interactive Lecture	PPT	8

			Cable laying through poles at construction sites	Participant will be able to, • Carryout cable laying through poles at construction sites	CON/ N0603 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, Pc10 PC13 Pc14 CON/ N0 604 Pc1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, Pc9, PC10 Pc13	Demonstration and practice Demonstration and practice	Consumables Single phase electrical cables of standard wire gauges Conduits/ casings/ 8 raceways Electrical diagram (consisting only basic wiring symbols) PVC insulation tape Measuring devices Digital Multimeter Tong tester Megger Hand tools Pliers Screw Drivers (set) Crimping tools Wire strippers Neon tester Hacksaw Power Tools Cutting machine Drill machine Measuring Instrument Measuring tapes Markers PPEs & safety equipment Helmet Safety shoe-safety belt Insulated rubber gloves Ear plugs Reflective jackets Safety message boards Fire extinguishers Sand buckets	8
			Straight through joining of cables	Participant will be able to, • Carryout straight through joining of cables				8

			Cable termination	Participant will be able to, • Carryout conduit laying and fixing wires through brick and concrete structures		Demonstration and practice		8
			Fixing of lights and their respective accessories	Participant will be able to, • Carryout fixing of lights and their respective accessories				8
			Electrical termination	Participant will be able to, • Carryout electrical termination				4
			Faults associated with lighting arrangements	Participant will be able to, • Carryout faults associated with lighting arrangements				4
			Tracing short circuits, power interruptions continuity	Participant will be able to, • Carryout tracing short circuits, power interruptions continuity				4
		UNIT 6.2: Direct cable laying	Cable laying by direct method at construction sites	Participant will be able to, • Explain the standard practice of cable laying through poles at construction sites	CON/ N0 603 PC1, PC2, PC3, PC4, PC5,PC6, PC7, PC8, PC9, PC10 PC13, PC14 CON/ N0 604 Pc1, PC2, PC3, PC4, PC5,PC6, PC7, PC8, PC9, PC10 PC13	Interactive Lecture	PPT	3
			Cable laying through Direct cable laying at construction sites	Participant will be able to, • Carryout cable laying through direct cable laying at construction sites		Demonstration and practice	Consumables Single phase electrical cables of standard wire gauges Conduits/ casings/ raceways Electrical diagram	8

			Straight through joining of cables	Participant will be able to, • Carryout straight through joining of cables laying at construction sites			(consisting only basic wiring symbols) PVC insulation tape Measuring devices Digital Multimeter Tong tester Megger Hand tools Pliers Screw Drivers (set) Crimping tools Wire strippers Neon tester Hacksaw Power Tools Cutting machine Drill machine Measuring Instrument Measuring tapes Markers PPEs & safety equipment Helmet Safety shoes Safety belt Insulated rubber gloves Ear plugs Reflective jackets Safety message boards Fire extinguishers Sand buckets	8
			Cable termination	Participant will be able to, • Carryout conduit laying and fixing wires through brick and concrete structures				8
			Fixing of lights and their respective accessories	Participant will be able to, • Carryout fixing of lights and their respective accessories				8
			Electrical termination	Participant will be able to, • Carryout electrical termination				4
			Faults associated with lighting arrangements	Participant will be able to, • Carryout faults associated with lighting arrangements				4
			Tracing short circuits, power interruptions continuity	Participant will be able to, • Carryout tracing short circuits, power interruptions continuity				4
		UNIT 6.3: Cable laying by draw-in method	Cable laying by Draw-in Method	Participant will be able to, • Explain the standard practice of cable laying through poles at construction sites	CON/ N0603 PC1, PC2, PC3, PC4, PC5,PC6, PC7, PC8, PC9, PC10 PC13,	Interactive Lecture Demonstration and practice	Consumables Single phase electrical cables of standard wire gauges Conduits/ casings/ raceways Electrical diagram (consisting only basic wiring symbols) PVC insu	3

			Cable laying through Direct cable laying at construction sites	Participant will be able to, Carryout cable laying through direct cable laying at construction sites	PC14 CON/ N0604 PC1, PC2, PC3, PC4, PC5,PC6, PC7, PC8, PC9, PC10 PC13		lation tape Measuring devices Digital Multimeter Tong tester Megger Hand tools Pliers Screw Drivers (set) Crimping tools Wire strippers Neon tester Hacksaw Power Tools Cutting machine Drill machine Measuring Instrument Measuring tapes Markers PPEs & safety equipment Helmet Safety shoes Safety belt Insulated rubber gloves Ear plugs Reflective jackets Safety message boards Fire extinguishers Sand buckets	8
			Straight through joining of cables	Participant will be able to, Carryout straight through joining of cables				8
			Cable termination	Participant will be able to, Carryout conduit laying and fixing wires through brick and concrete structures				8
			Fixing of lights and their respective accessories	Participant will be able to, Carryout fixing of lights and their respective accessories				8
			Electrical termination	Participant will be able to, • Carryout electrical termination				4
			Faults associated with lighting arrangements	Participant will be able to, • Carryout faults associated with lighting arrangements				4
			Tracing short circuits, power interruptions continuity	Participant will be able to, • Carryout tracing short circuits, power interruptions continuity				4
7	Electrical drawings	UNIT 7.1: Conduit laying, wiring and fixing the fixtures through brick structures	Conduit laying, wiring and fixing the fixtures through brick structures	Participant will be able to, • Explain steps involved in conduit laying, wiring and fixing the fixtures through brick structures	CON/ N0604 KA1,KA2 KA3,KA4 KA5	Interactive Lecture	Consumables Single phase electrical cables of standard wire gauges Conduits/ casings/ raceways	3

				Participant will be able to, • Carryout steps involved in conduit laying, wiring and fixing the fixtures through brick structures	CON/ N08604 PC4,PC5	Demonstration and practice	Electrical diagram (consisting only basic wiring symbols) PVC insulation tape Measuring devices Digital Multimeter Tong tester Megger Hand tools Pliers Screw Drivers (set) Crimping tools Wire strippers Neon tester Hacksaw Power Tools Cutting machine Drill machine Measuring Instrument Measuring tapes Markers PPEs & safety equipment Helmet Safety shoes Safety belt Insulated rubber gloves Ear plugs Reflective jackets Safety message boards Fire extinguishers Sand buckets	8

		UNIT 7.2: Earthing and its types	Earthing importance and types	Participant will be able to, • Explain the need for earthing • State the types of earthing • Describe the importance of earthing • List the steps involved in pipe earthing • List the steps involved in plate earthing • Identify electrical appliances need earthing at construction site • Describe the concept of electrical earthing procedure in domestic wiring • Describe the concept of electrical earthing procedure in temporary panels	CON/ N0604 KB1,KB2, KB3, KB4,KB5, KB8 KB10, KB14, KB17, KB18, KB 20 KB5,KB17, KB18,KB 20, SB1, SB2, SB3,SB4, SB5 SB6,SB7, SB8, SB9,SB10 , SB11,SB1 2, SB13,SB1 4, SB15,SB1 6, SB17,SB1 8	Interac-tive Lec-ture	PPT	3
			Carryout plate earthing	Participant will be able to, • • Carryout plate earthing	CON/N0 8 604 PC10, PC11	Demon-stration and prac-tice	Consu-mables Single phase electrical cables of standard wire gauges Conduits/ casings/ raceways Electrical diagram (consisting only basic wiring symbols) PVC insulation tape Measuring devices Digital Multimeter Tong tester Megger Hand tools Pliers Screw Drivers (set)	8

			Measure ground resistance	Participant will be able to, • Measure ground resistance	PC12, PC13	Demonstration and practice	Crimping tools Wire strippers Neon tester Hacksaw Power Tools Cutting machine Drill machine Measuring Instrument Measuring tapes Markers PPEs & safety equipment Helmet Safety shoes Safety belt Insulated rubber gloves Ear plugs Reflective jackets Safety message boards Fire extinguishers Sand buckets	4
			Carryout earthing in temporary panels	Participant will be able to, • Carryout earthing in temporary panels				4
			Carry out earthing in domestic wiring	Participant will be able to, • Carry out earthing in domestic wiring				4
			Carry out earthing in electrical appliances	Participant will be able to, • Carry out earthing in electrical appliances				4
			Carryout pipe earthing	Participant will be able to, • Carryout pipe earthing	CON/N0 8 604 PC10, PC11 PC12, PC13			4
			Measure ground resistance	Participant will be able to, • Measure ground resistance				4
			Carryout earthing in temporary panels	Participant will be able to, • Carryout earthing in temporary panels				4
			Carry out earthing in domestic wiring	Participant will be able to, • Carry out earthing in domestic wiring				4
			Carry out earthing in electrical appliances	Participant will be able to, • Carry out earthing in electrical appliances				4
		UNIT 7.3: Conduit laying through concrete structures (slab	Conduit laying through slab	Participant will be able to • Explain how to read and understand the conduit layout drawing. • Explain how to identify ceiling fan box and other electrical accessory points. • Explain the procedure of conduit laying through concrete structure (slab). • Explain the importance of dummy wires inside conduits. • List out the checks that are to be carried out after installation	CON/ N0604 KA1,KA2 KA3,KA4 KA5	Interactive Lecture	PPT	1

			Conduit laying through slab Practical	Participant will be able to • Install ceiling fan box and accessories as per the requirement. • Place dummy wires inside conduits. • Carry out the procedure of conduit laying through concrete structures (slab) as per drawing	CON/ N0604 PC4,PC5	Demonstration and practice	Consumables, Measuring devices, Hand tools, Power tools, Measuring Instrument, PPEs & Safety Equipment	8
8	Installation and maintenance of temporary LV electrical panels	UNIT 8.1: Installation, fault checking and maintenance of temporary LV electric panels	Installation of temporary panel/ distributi on board	Participant will be able to, • Describe the method of connecting temporary panel/ DBs with main power outlet. • Describe the method of electrical termination at power outlets using appropriate fixtures. • Explain the standard procedure of shifting and installing DBs among different work location	CON/ N0605 KA1, KA2, KA3, KA4, KA5 KB1, KB2, KB3, KB4, KB5, KB6, KB7, KB8, KB8, KB9, KB10, B11,KB12, B13, KB14, KB15, B16,KB17, KB18, B19,KB20, KB21, KB23 CON/ N0 605 PC1,PC2, PC3, PC4,PC5, PC6, PC7, PC8, PC9 PC10, PC11,	Interactive Lecture	PPT	3
			Install temporary panel/ distributi on board	Participant will be able to • Install temporary panel/distributio n board		Demonstration and practice		8
			Electrical termination	Participant will be able to • Carryout electrical termination				4
			Check for faults associated with distribution boards	Participant will be able to • Check for faults associated with distribution boards				4
			Quality checks for temporary panels	Participant will be able to • Carryout quality checks for temporary panels				4

9	Employability Skills	Unit 9.1: Employability Skills	Introduction to Employability Skills	Discuss the Employability Skills required for jobs in various industries. List different learning and employability related GOI and private portals and their usage.	DGT/VSQ/N0101	Team Activity: Interactive discussion	Handbook	2
			Constitutional values - Citizenship	Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen. Show how to practice different environmentally sustainable practices.	DGT/VSQ/N0101	Classroom lecture, discussion, demonstration, practical		2
			Becoming a Professional in the 21st Century	Discuss importance of relevant 21st century skills. Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life. Describe the benefits of continuous learning.	DGT/VSQ/N0101			4
			Basic English Skills Communication Skills	Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone. Read and interpret text written in basic English. Write a short note/ paragraph / letter/e -mail using basic English.	DGT/VSQ/N0101	Team Activity: Roleplay, video session		5

	Employ-ability Skills			Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette. Explain the importance of active listening for effective communication. Discuss the significance of working collaboratively with others in a team.	DGT/VSQ/N0101	Class-room session, Team Activity: Round of Inter-ac-tive dis-cussion		2
			Diversity & Inclusion	Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD. Discuss the significance of escalating sexual harassment issues as per POSH act.	DGT/VSQ/N0101			2
			Financial and Legal Literacy	Outline the importance of selecting the right financial institution, product, and service. Demonstrate how to carry out offline and online financial transactions, safely and securely. List the common components of salary and compute income, expenditure, taxes, investments etc. Discuss the legal rights, laws, and aids.	DGT/VSQ/N0101			7
			Essential Digital Skills	Describe the role of digital technology in today's life. Demonstrate how to operate digital devices and use the associated applications and features, safely and securely. Discuss the significance of displaying responsible online behavior while browsing, using various social media platforms, e-mails, etc., safely and securely. Create sample word documents, excel sheets and presentations using basic features utilize virtual collaboration tools to work effectively.	DGT/VSQ/N0101			10

			Entrepre-neurship	Explain the types of entrepreneurship and enterprises. Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan. Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement. Create a sample business plan, for the selected business opportunity.	DGT/VSQ/ N0101	Class-room lec-ture, dis-cussion, Demon-stration, practical, Team Activity: Role play, video session		8
			Customer Service	Describe the significance of analysing different types and needs of customers. Explain the significance of identifying customer needs and responding to them in a professional manner. Discuss the significance of maintaining hygiene and dressing appropriately.	DGT/VSQ/ N0101			4
			Getting Ready for ap-prenticeship & Jobs	Create a professional Curriculum Vitae (CV). Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively. Discuss the significance of maintaining hygiene and confidence during an interview. Perform a mock interview. List the steps for searching and registering for apprenticeship opportunities.	DGT/VSQ/ N0101			4

Annexure - II

Assessment Guidelines and Assessment Weightage	
Job Role	**Assistant Electrician**
Qualification Pack	CON/Q0602
Sector Skill Council	Construction Skill Development Council of India

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2	The assessment for the knowledge part will be based on knowledge bank of questions created by Assessment
3	Individual assessment agencies will create unique question papers for knowledge/theory part for assessment of candidates as per assessment criteria given below
4	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on assessment criteria.
5	The passing percentage for each QP will be 50%. To pass the Qualification Pack, every trainee should score a minimum of 50% individually in each NOS.
6	The Assessor shall check the final outcome of the practices while evaluating the steps performed to achieve the final outcome
7	The trainee shall be provided with a chance to repeat the test to correct his procedures in case of improper performance, with a deduction of marks for each iteration.
8	After the certain number of iteration as decided by SSC the trainee is marked as fail, scoring zero marks for the procedure for the practical activity.
9	In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack within the specified timeframe set by SSC.
10	Minimum duration of Assessment of each QP shall be of 4hrs/trainee.

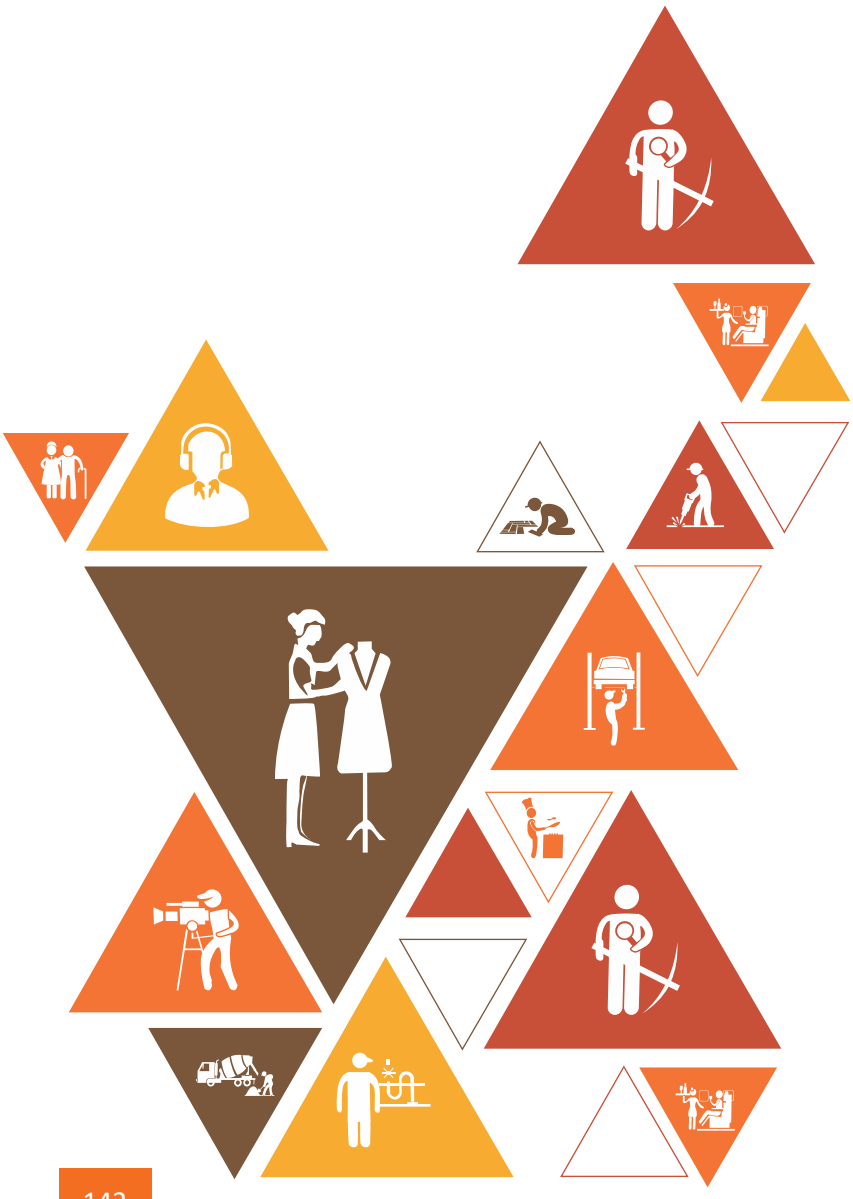
National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
Handle hand and power tools relevant to construction electrical works (CON/N0602)	30	70	0	0	100	15
Install temporary lighting arrangements at construction sites (CON/N0603)	30	70	0	0	100	20
Assist in LV (low voltage) electrical wiring at permanent structures (CON/N0604)	30	70	0	0	100	20
Assemble, install and maintain temporary LV electrical panels (distribution boards) at the construction site (CON/N0605)	30	70	0	0	100	15
Work effectively in a team to deliver desired results at the workplace (CON/N8001)	30	70	-	-	100	8
Plan and organize work to meet expected outcomes (CON/N8002)	30	70	-	-	100	7
Work according to personal health, safety and environment protocols at the construction site (CON/N9001)	30	70	-	-	100	10
Employability Skills (DGT/VSQ/ N0101)	20	30	-	-	50	5
Total	**230**	**520**	**-**	**-**	**750**	**100**

Annexure-III

Annexure of QR Codes for Assistant Electrician

Chapter Name	Unit Name	Topic Name	URL	QR Code
1. Introduction to Assistant Electrician Job Role	Unit 1.2 Role and Responsibilities of an Assistant Electrician	1.1.5 Introduction to Assistant Electrician Trade	https://www.youtube.com/watch?v=gopyUU-JtwxY	Introduction to Assistant Electrician Trade
		1.1.8 Assistance Electrician importance	https://www.youtube.com/watch?v=3nmWxgU-CuvE	Assistance Electrician importance
2. Handling Construction Hand and Power Tools	Unit 2.1 Construction Hand and Power Tools	2.1.1 Electric Current	https://www.youtube.com/watch?v=1tAkPi-brJ3M	Electric Current
		2.1.5 Types of Electric Circuit	https://www.youtube.com/watch?v=RQ3d-jos_LY8	Types of Electric Circuit
		2.1.9 Ampere's Law	https://www.youtube.com/watch?v=FZ3saUFp-DHM	Ampere's Law
		2.1.16 Electrical Measuring Instruments	https://www.youtube.com/watch?v=qxqGIGjyY-TU&list=PLhSp9OSVmey-Kvw2DTpzlCdl226DJ-QjTx	Electrical Measuring Instruments

3. Installing Temporary Lighting	Unit 3.1 Installing Temporary Lighting	3.1.1 Interpreting Single Line Diagram	https://www.youtube.com/watch?v=gpbBhZcLrWs	Interpreting Single Line Diagram
		3.1.2 Cables in Electrical Systems	https://www.youtube.com/watch?v=tGcTQWOPPYo	Cables in Electrical Systems
		3.1.3 Types of Conduits and Fixtures	https://www.youtube.com/watch?v=_cJopRjNEH0	Types of Conduits and Fixtures
4. Assist in LV (low voltage) Electrical Wiring at Permanent Structures	Unit 4.2 Electrical Earthing Procedure in Domestic Wiring	4.2.1 What is Earthing	https://www.youtube.com/watch?v=wt-xeJfRXMU	What is Earthing
5. Assembling, Installing and Maintaining Temporary LV Electrical Panels	Unit 5.1 Installation and Maintenance of Temporary LV Electrical Panels	5.1.1 Connecting Temporary Panel/DBs with Main Power Outlet	https://www.youtube.com/watch?v=KKaZ22DmzWQ	Connecting Temporary Panel/DBs with Main Power Outlet



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