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Construction Skill Development Council

Facilitator Guide



Assistant Bar Bender and Steel Fixer

Sector
Construction Skill Development Council of India

Sub-Sector
Real Estate and Infrastructure Construction

Occupation
Bar Bending and Fixing

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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 on this job role. The aim of the course is to provide both theoretical and practical knowledge to the trainees, and also to guide them regarding the procedure of assisting in bar bending and steel fixing works. The guide is neither a substitute nor 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 for covering a topic and includes some additional information that may be necessary for the trainer to develop better comprehension on the following aspects:

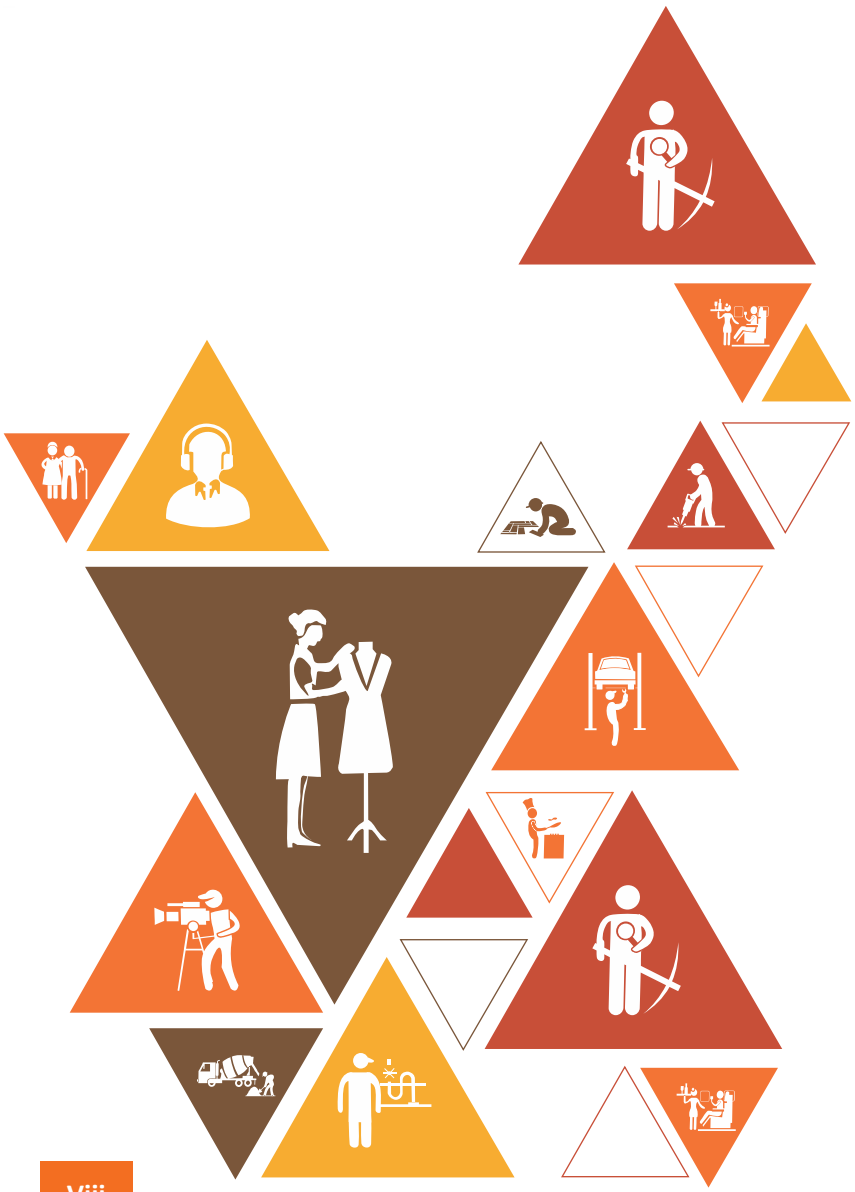
- **Knowledge and Understanding:** Satisfactory operational learning and comprehension to play out the required chore.
- **Performance Criteria:** Pick up the required aptitudes through hands-on preparation and play out the required operations inside the predetermined measures.
- **Professional Skills:** 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 by hands-on training. But it has to be ensured that these are in accordance with the knowledge imparted and time spent on each unit. It is expected that irrespective of the region, knowledge on 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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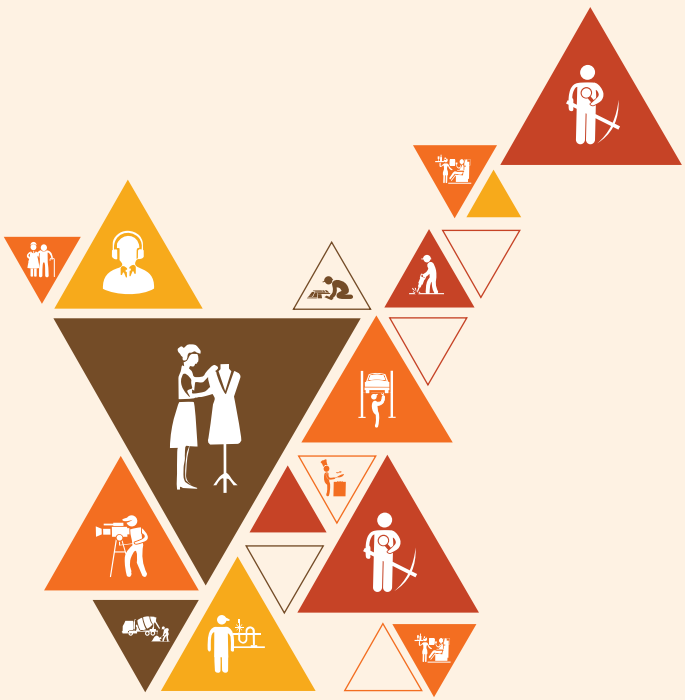
1. Introduction to Bar Bending and Steel Fixing Occupation

Unit 1.1 - Introduction to Bar Bending and Steel Fixing

Unit 1.2 - Role and Responsibilities of an Assistant Bar Bender and Steel Fixer



Key Learning Outcomes

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

1. Define the role of an assistant bar bender and steel fixer
2. Explain the personal attributes required to be an assistant bar bender and steel fixer
3. Recall the basic terms used in the occupation of bar bending and steel fixing
4. Discuss future possible progression and career options for assistant bar bender and steel fixer.

Unit 1.1: Introduction to Bar Bending and Steel Fixing

Unit Objectives

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

1. Give an overview of the construction industry.
2. Recall the basic terms used in the occupation of bar bending and steel fixing.

Resources to be used

- Available objects such as training kit - trainer guide, presentations, whiteboard, marker, projector, laptop, video films, etc.
- PowerPoint slides, pictures/posters and videos depicting various information about the construction industry, types of construction, basic categories of construction projects, and market segments of the construction industry.

Say

- In this session, we shall learn key facts about the construction industry, types of construction, basic categories of construction projects, and market segments of the construction industry.
- 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.

Say

I hope everyone enjoyed our first activity and now let's move on to the topics covered in this session.

Ask

- What do you understand about the construction industry?
- Do you know how many types of construction are there?

Elaborate

With the help of audio-visual aids and the participant handbook, elaborate:

- Construction Industry
- Construction Industry in India
- Types of Construction
- Construction Project Categories
- Market Segments of the Construction Industry
- Occupation of Bar Bending And Steel Fixing

Demonstrate

Show a PowerPoint presentation to the class on Construction Industry in India - https://www.slideserve.com/frieda/construction-sector-in-india-powerpoint-ppt-presentation and ask participants to note down the important points.

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:
  1. Understand the concept of market segmentation in the construction industry.
  2. Identify the various market segments within the construction field, including residential, commercial, industrial, infrastructure, and specialized sectors.
  3. Analyse the characteristics, opportunities, and challenges associated with each market segment.
  4. Gain insights into potential career paths and specialization options within the construction industry.
  5. Reflect on their interests and skills to make informed decisions about their vocational course and future career goals in construction.

Say

Did you think the activity improved your understanding? I'm hoping now you have a better idea of the various market segment of the construction industry.

Summarize

- Note down the important points related to the construction industry, types of construction, and various market segments.
- Revise these points with the participants.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topics
- Arrange audio-visual aids for a better understanding of the topics.
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Notes

Unit 1.2: Role and Responsibilities of an Assistant Bar Bender and Steel Fixer

Unit Objectives

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

1. Describe the role and responsibilities of an Assistant Bar Bender and Steel Fixer
2. Discuss future possible progression and career options for an Assistant Bar Bender and Steel Fixer

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information about the roles and responsibilities of an Assistant Bar Bender and Steel Fixer.

Say

In the previous session, we discussed India's construction sector, types of construction and segments of construction industry. In this session, we shall learn about the roles and responsibilities of an Assistant Bar Bender and Steel Fixer.

Ask

- Does anyone know what does an Assistant Bar Bender and Steel Fixer do?

Demonstrate

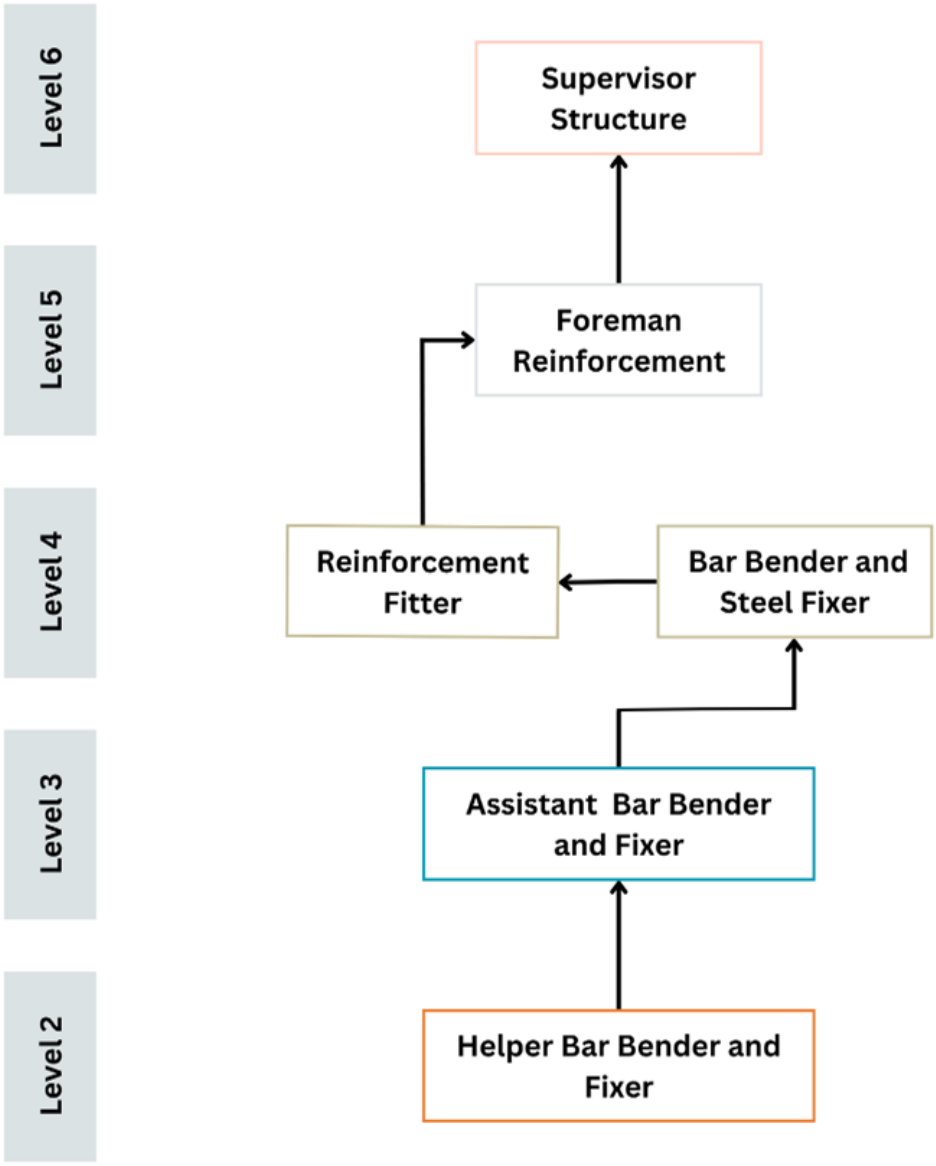


Fig. 1.2.1 Career Progression of an Assistant Bar Bender and Steel Fixer

Present the above image to the participants using a projector and explain the career path of an Assistant Bar Bender and Steel Fixer and ask the participants the following questions:

- Test that everyone knows about the skills and key competencies required to become an Assistant Bar Bender and Steel Fixer.
- Write down the participants' answers on whiteboard/flipchart. Take appropriate clues from the answers and start teaching the lesson.

Activity

- In this activity, you invite an experienced Assistant Bar Bender and Steel Fixer to give an overview of the roles, responsibilities, skill sets, and personal attributes required for the job role.
- You will conduct a group discussion session.
- If the students have any queries or they have any confusion regarding this chapter, they will raise their hands
- On availing permission, the students can ask questions.
- In addition to this, the expert will also share important pointers on areas like:
    1. Routine activities of an Assistant Bar Bender and Steel Fixer.
    2. Companies offering jobs for this role.
- After the doubts are cleared, the expert or you may add a few points in relation to meeting the requirements.
- In addition to those, you can also include a few extra points that you may find reliable to the topic and beneficial for the students

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now? Let us summarise the points discussed.

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Ask

- What are the primary responsibilities of an Assistant Bar Bender and Steel Fixer?

Notes for facilitation

- Initiate the session with the participants by discussing the objectives of the module.
- Make the session interactive by asking the participants to share their expectations from the module on the blackboard/whiteboard.
- Introduce the topics to be covered and give some information about them.
- Give the participants a general idea about what will be covered in the module.

Exercise

Key Solutions to PHB Exercise

1.

i. Building construction

ii. Industrial Construction

iii. Infrastructure Construction

2.

Bar bending and fixing, also known as reinforcement detailing, is an essential process in the construction industry that involves cutting and bending steel bars to specific shapes and sizes, and placing them in concrete to enhance its strength and durability. In India, bar bending and fixing is an integral part of the construction sector and plays a crucial role in the development of infrastructure and building projects.

3.

i. Cutting and bending rebar.

ii. Transporting and positioning rebar.

iii. Securing and fastening rebar.

iv. Assisting with pouring concrete.

v. Cleaning up the construction site and maintaining tools and equipment

4. List the career opportunities available for an assistant bar bender and steel fixer.

i. Bar Bender and Steel Fixer

ii. Reinforcement Fitter

iii. Site Supervisor

iv. Foreman Reinforcement

v. Estimator

5.

a. Reinforcing Bar

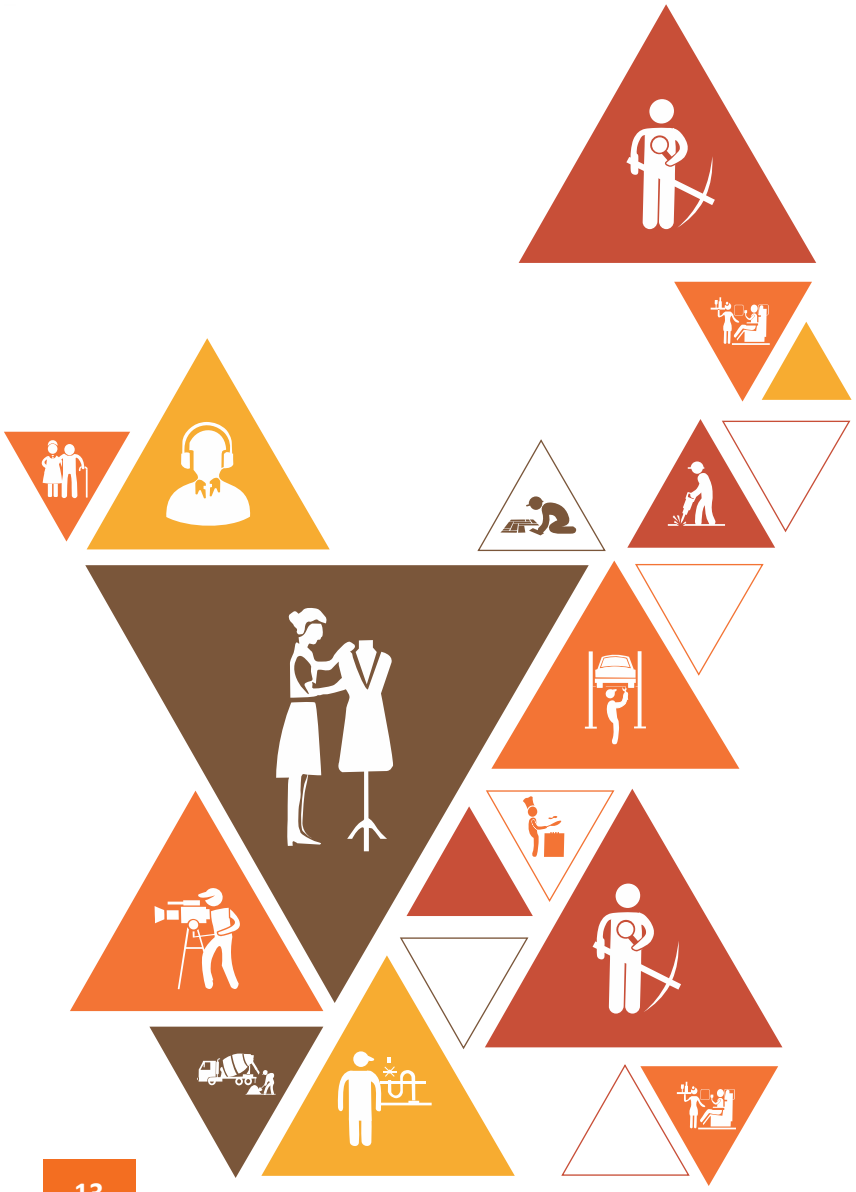
b. U-shape

c. Bar bending schedule

d. Bending Machine

e. Bar Mark

Notes



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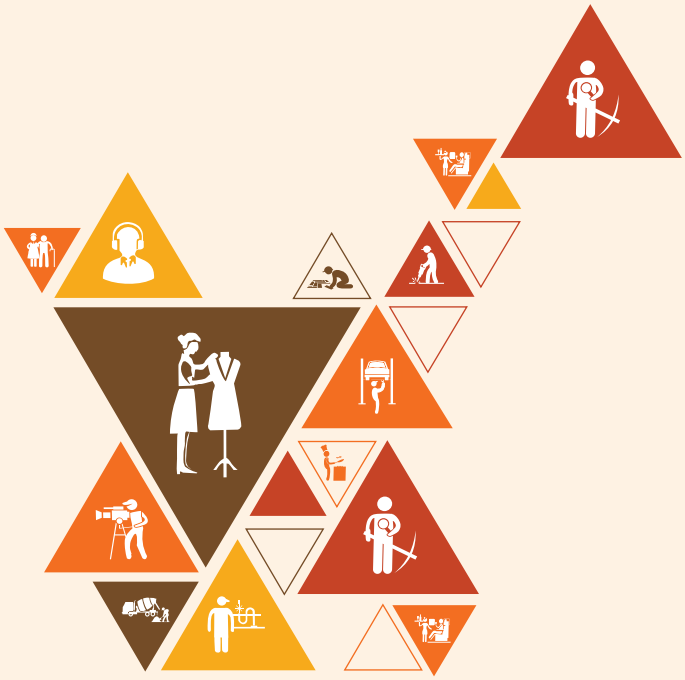
2. Interpret Reinforcement Bar Detail from Hand Sketches

Unit 2.1 Interpret Reinforcement Hand Sketches



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Key Learning Outcomes

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

1. List different systems of linear measurement
2. Apply the basic knowledge of units, measurement and arithmetic calculation relevant to bar bending work
3. Describe the different types of reinforcement bars, their grade and standard size
4. Determine diameter, cutting length, cover, number and shape of reinforcement bars from hand sketch
5. Determine spacing details for stirrups, chairs, space bars etc. by interpreting hand sketches relevant to bar bending works.

Unit 2.1: Interpret Reinforcement Hand Sketches

Unit Objectives

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

1. List different systems of linear measurement
2. Apply the basic knowledge of units, measurement and arithmetic calculation relevant to bar bending work
3. Describe the different types of reinforcement bars, their grade and standard size
4. Determine diameter, cutting length, cover, number and shape of reinforcement bars from hand sketch
5. Determine spacing details for stirrups, chairs, space bars etc. by interpreting hand sketches relevant to bar bending works.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information about rebar types, grades, sizes and sketches.

Say

In the previous session, we discussed roles and responsibilities of an Assistant Bar Bender and Steel Fixer. In this session, we shall learn about the systems of linear measurements, types of reinforcement bars, their grade and standard size and, rebar sketches and their interpretation.

Elaborate

- Systems of linear measurement
- Types of reinforcement bars, their grade and standard size
- Rebar Sketches and their interpretation

Notes for facilitation

- Initiate the session with the participants by discussing the objectives of the module.
- Make the session interactive by asking the participants to share their expectations from the module on the blackboard/whiteboard.
- Introduce the topics to be covered and give some information about them.
- Give the participants a general idea about what will be covered in the module.

Activity

- **Topic:** Reinforcement Bar Sorting and Identification
- **Purpose:** The purpose of this practical activity is to help participants become familiar with different types of reinforcement bars, their grades, and standard sizes through hands-on experience.
- **Resources:**
  - Assorted reinforcement bars of various types (e.g., mild steel, high-strength deformed bars, stainless steel), grades, and standard sizes.
  - Identification charts or reference materials displaying the characteristics of each reinforcement bar type.
- **Procedure:**
  - Prepare a collection of different reinforcement bars, making sure to include a variety of types, grades, and standard sizes.
  - Divide participants into small groups.
  - Provide each group with the assortment of reinforcement bars and the identification charts or reference materials.
  - Instruct the groups to sort the reinforcement bars based on their type, grade, and standard size.
  - Encourage participants to discuss the distinguishing features of each type and verify their choices using the provided reference materials.
  - After the sorting is complete, hold a group discussion where participants share their findings and discuss any challenges encountered during the activity.
  - Conclude the practical session by summarizing the main characteristics of each type of reinforcement bar and emphasizing their significance in construction projects

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now? Let us do another activity.

Activity

- **Topic:** Rebar Sketches and their Interpretation
- **Purpose:** The purpose of this activity is to familiarize participants with interpreting rebar sketches and understanding the required reinforcement details for concrete structures.
- **Resources:**
  - ♦ A set of rebar sketches representing different concrete elements (e.g., beams, columns, slabs).
  - ♦ Reinforcement code guidelines and specifications.
- **Tentative Duration:** 60-90 minutes
- **Procedure:**
  1. **Introduction and Overview:**
     - Begin by explaining the importance of accurate rebar detailing in reinforced concrete structures.
     - Introduce the activity's objective: to interpret rebar sketches and understand the reinforcement requirements for various concrete elements.
  2. **Presentation on Rebar Sketches and Codes:**
     - Conduct a brief presentation that covers the basics of rebar sketches, including symbols, annotations, and terminology.
     - Explain the significance of following reinforcement code guidelines and standards for different structural elements.
  3. **Divide Participants into Groups:**
     - Divide participants into small groups of 3-5 members.
     - Ensure each group has access to the set of rebar sketches.
  4. **Interpretation of Rebar Sketches:**
     - Provide each group with a different set of rebar sketches representing various concrete elements (e.g., one group gets a beam sketch, another gets a column sketch, and so on).
     - Instruct each group to carefully analyse the rebar sketches and identify the reinforcement details required for each element.
  5. **Apply Code Guidelines:**
     - Encourage participants to use the provided reinforcement code guidelines and specifications to determine the correct rebar arrangements, spacing, and dimensions for each concrete element.
  6. **Group Discussions and Decision-Making:**
     - Allow sufficient time for group discussions, where participants can collectively interpret the rebar sketches and make decisions regarding the required reinforcement.
     - Facilitate the discussions by addressing questions and providing guidance, if needed.

7. **Presentation and Justification:**
    - a. Ask each group to present their interpreted rebar sketches to the rest of the participants.
    - b. Have each group explain their thought process, justification for the chosen rebar arrangement, and how they applied the reinforcement code guidelines.
8. **Comparison and Review:**
    - a. Facilitate a group discussion to compare and review the different interpretations presented by each group.
    - b. Discuss any variations in interpretations and identify the correct reinforcement details based on the reinforcement code guidelines.

- **Conclusion:**
    - ♦ Summarize the activity by highlighting the importance of accurate rebar detailing and interpretation in ensuring the structural integrity of reinforced concrete elements.
    - ♦ Emphasize the significance of adhering to the relevant reinforcement code guidelines for construction projects.
- **Expected Outcome:** By the end of this activity, participants should have gained practical experience in interpreting rebar sketches and understanding the reinforcement requirements for various concrete elements. They should also be familiar with the significance of following reinforcement code guidelines to ensure the safety and stability of reinforced concrete structures.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Ask

- What are the different types of rebar?
- Can you interpret rebar sketches?

Exercise

Key Solutions to PHB Exercise

1.

Reinforcing steel, also known as rebar or reinforcing bar, is used to reinforce the concrete and provide additional strength and durability.

Types of Rebar:

i. Plain Mild Steel Bars

ii. Plain Carbon/Back Steel Bar

iii. Deformed Steel Bar

iv. Epoxy-Coated Rebar

v. Galvanized Rebar

vi. Stainless Steel Rebar

vii. Glass-Fiber-Reinforced-Polymer (GFRP) Rebar

2.

Four primary marking symbols are used:

i. Manufacturer's code

ii. Numerical code indicating the bar's size

iii. Letter code for the steel type

iv. Grade of Steel

3.

A tabular depiction of reinforcing bar is known as a bar bending schedule or schedule of bars. The basic description of a bar bending schedule includes the specifics of the bars, the shape of the bending with illustrations, the overall length and weight of the bars, as well as their numbers.

4.

i. Look for the symbols or notes on the sketch

ii. Identify the spacing requirements for the stirrups

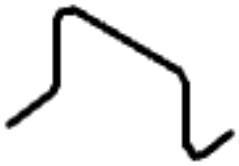
iii. Determine the spacing requirements for the main and secondary rebar

iv. Identify the required height of the bar chairs

v. Determine the required spacing and placement of the spacer bars.

vi. Double-check that all the spacing details comply with the design standards and codes

5. Match the following:

Description	Symbol
Chair Bar	
Direction in which bars extend	
Diameter of Plain round bar	
Right-angle-bent bar	
Bar with Hooks	

Notes

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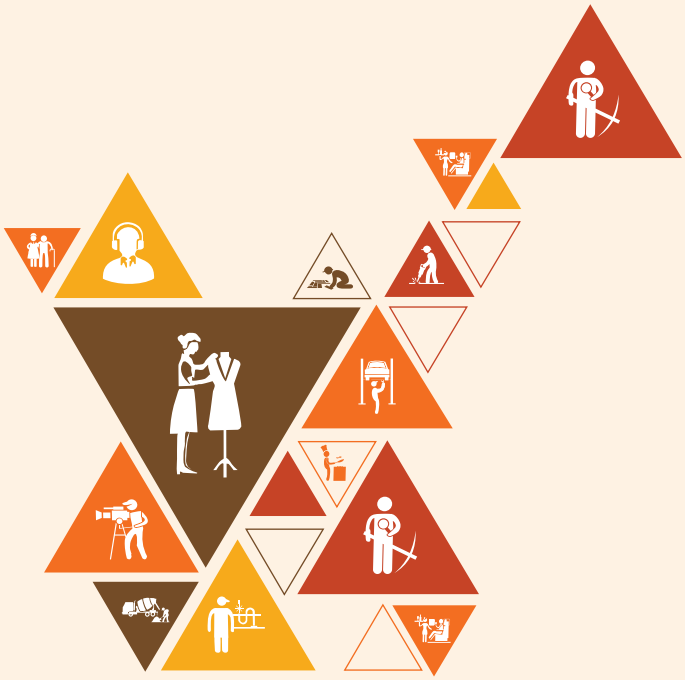
3. Tools and Equipment relevant to Reinforcement Works

Unit 3.1 Reinforcement Tools and Equipment



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Key Learning Outcomes

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

1. Classify the reinforcement bar with respect to their grade and size.
2. Differentiate binding wires based on materials and thickness
3. Identify the different types of hand tools and power tools used for steel reinforcement works.
4. Demonstrate the use of hand tools for cutting rebars.
5. Demonstrate the use of power tools like circular cutting machine (handheld and table mounted) and shearing machine for cutting rebar.
6. Describe the process adopted for care and maintenance of hand and power tools used in bar bending works.
7. Demonstrate the use of threading machine for marking threads on reinforcement bars.
8. Demonstrate the use of bar bending machine
9. Explain use of lifting gears and equipment used in reinforcement work
10. Demonstrate the use of slings, shackles and lifting belts for lifting and shifting of rebar
11. State the importance of maintaining proper body postures while using hand and power tools

Unit 3.1: Reinforcement Tools and Equipment

Unit Objectives

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

1. Classify the reinforcement bar with respect to their grade and size.
2. Differentiate binding wires based on materials and thickness
3. Identify the different types of hand tools and power tools used for steel reinforcement works.
4. Demonstrate the use of hand tools for cutting rebars.
5. Demonstrate the use of power tools like circular cutting machine (handheld and table mounted) and shearing machine for cutting rebar.
6. Describe the process adopted for care and maintenance of hand and power tools used in bar bending works.
7. Demonstrate the use of threading machine for marking threads on reinforcement bars.
8. Demonstrate the use of bar bending machine
9. Explain use of lifting gears and equipment used in reinforcement work
10. Demonstrate the use of slings, shackles and lifting belts for lifting and shifting of rebar
11. State the importance of maintaining proper body postures while using hand and power tools

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information about the tools and equipment used in bar bending works.

Say

In the previous session, we discussed the systems of linear measurements, types of reinforcement bars, their grade and standard size and, rebar sketches and their interpretation. In this session, we shall learn about the types of hand tools and power tools, their maintenance, and lifting gears and equipment used in reinforcement work.

Ask

- Has anyone used any tools used in bar bending occupation?

Elaborate

- Types of hand tools and power tools used for steel reinforcement works
- Maintenance of hand and power tools used in bar bending works
- Lifting gears and equipment used in reinforcement work

Notes for facilitation

- Initiate the session with the participants by discussing the objectives of the module.
- Make the session interactive by asking the participants to share their expectations from the module on the blackboard/whiteboard.
- Introduce the topics to be covered and give some information about them.
- Give the participants a general idea about what will be covered in the module.

Activity

- **Topic:** Types of hand tools and power tools used for steel reinforcement works
- **Purpose:** The purpose of this activity is to familiarize participants with various hand tools and power tools commonly used in steel reinforcement works during construction projects.
- **Resources:**
  - Display or images of different hand tools and power tools used in steel reinforcement works.
  - Information sheets describing the purpose and proper usage of each tool.
- **Tentative Duration:** 60-90 minutes
- **Procedure:**
  - **Introduction and Overview:**
    - Begin by explaining the significance of using appropriate hand tools and power tools in steel reinforcement works for construction projects.
    - Introduce the activity's objective: to learn about different hand tools and power tools used in steel reinforcement works and understand their functions.
  - **Presentation on Hand Tools and Power Tools:**
    - Conduct a visual presentation showcasing different hand tools and power tools used in steel reinforcement works.
    - Explain the purpose and application of each tool, along with safety precautions and proper handling.
  - **Divide Participants into Groups:**

- Divide participants into small groups of 3-5 members.
- Assign specific hand tools or power tools to each group.

♦ **Tool Identification and Function:**

- Provide each group with images or displays of the hand tools or power tools assigned to them.
- Instruct the groups to identify the tools and discuss their functions in steel reinforcement works.

♦ **Research and Information Gathering:**

- Encourage participants to research and gather additional information about the assigned tools from the provided information sheets or other reliable sources.

♦ **Group Presentations:**

- Ask each group to present their assigned hand tools or power tools to the rest of the participants.
- During the presentations, have each group explain the tool's name, purpose, how it is used in steel reinforcement works, and any safety considerations.

♦ **Demonstrations (Optional):**

- If possible, arrange live demonstrations of some hand tools and power tools to show their proper usage and handling techniques.

♦ **Comparison and Discussion:**

- Facilitate a group discussion to compare and discuss the different hand tools and power tools presented by each group.
- Encourage participants to share insights, experiences, or real-world examples where these tools are commonly used in construction projects.

- **Conclusion:**
  - ♦ Summarize the activity by emphasizing the importance of using the right hand tools and power tools in steel reinforcement works to ensure efficiency, accuracy, and safety.
  - ♦ Highlight how the knowledge gained from this activity can contribute to their effectiveness as Assistant Bar Benders and Steel Fixers.

- **Expected Outcome:** By the end of this activity, participants should have gained practical knowledge about various hand tools and power tools used in steel reinforcement works. They should be familiar with the purpose and proper usage of each tool, enabling them to make informed decisions while working on construction projects involving steel reinforcement. Additionally, participants should recognize the importance of using the right tools to ensure quality workmanship and safety on the construction site.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Ask

- What are the different types of rebar?
- Can you interpret rebar sketches?

Exercise

1.

i. Design and preparation
ii. Cutting and bending
iii. Placing the rebars
iv. Checking alignment
v. Pouring the concrete
vi. Curing
vii. Inspection

2.

i. Measurement Tape
ii. Chisel
iii. Hammer
iv. Bar tying hook
v. Bending lever
vi. Gauge measure
vii. Podger Spanner
viii. Hack saw blade and frame
ix. Steel scale
x. Try Square
xi. Spirit level
xii. Plumb bob

3.

i. Steel Binding Wire
ii. Galvanized Steel Binding Wire
iii. Stainless Steel Binding Wire
iv. Copper Coated Binding Wire

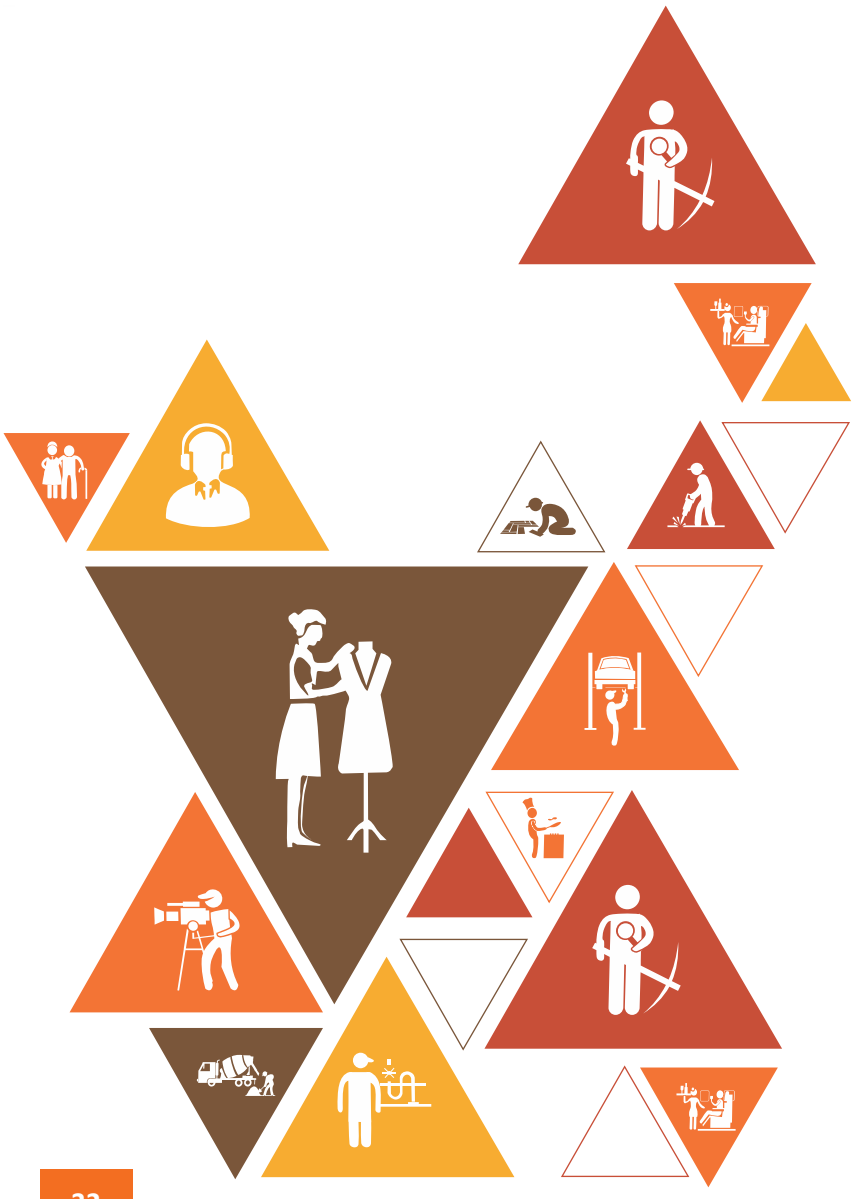
4.

i. Prevents injuries
ii. Improves accuracy
iii. Increases efficiency
iv. Reduces risk of accidents
v. Promotes good health

5.

a. Threading Machine: A threading machine is a power tool used in steel reinforcement works to cut threads on the end of steel bars or rebar.
b. Shearing Machine: A shearing machine works by using a set of blades to apply a shearing force to the metal being cut, resulting in a clean and accurate cut.
c. Bar bending Machine: A bar bending machine is a type of power tool used in steel reinforcement works to bend steel bars or rebar to the desired shape and size.

Notes



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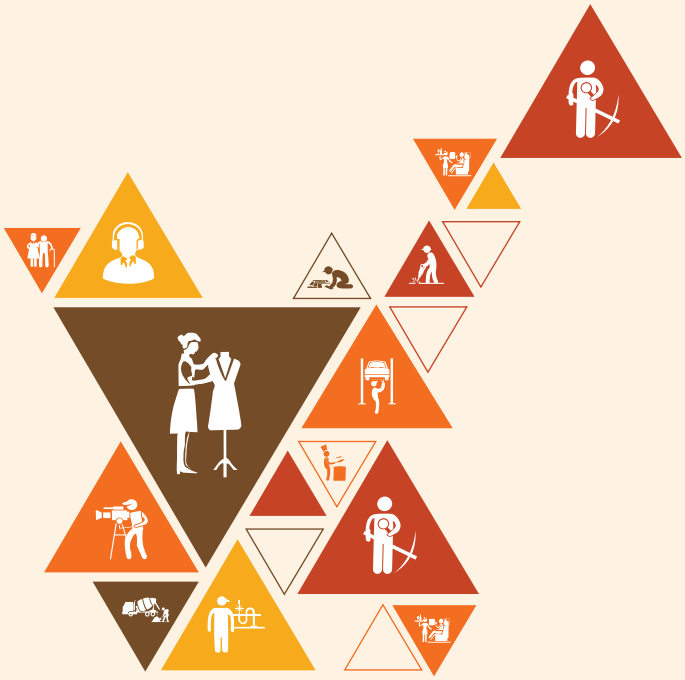
4. Cutting and Bending of Rebar for Simple Shapes

Unit 4.1 - Cutting and Bending of Rebar



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Key Learning Outcomes

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

1. Explain the procedure of measuring, marking and cutting of reinforcement bars into simple shapes.
2. List the types of stirrups, chairs and hanger bar
3. Describe tolerance limit for cutting and bending of the reinforcement bar
4. Explain the importance of maintaining proper body posture while cutting and bending reinforcement bars
5. Demonstrate marking and cutting of rebar to the specified length using appropriate hand cutting tools.
6. Demonstrate marking and cutting of rebar to the specified length using appropriate power cutting tools.
7. Demonstrate bending of reinforcement bar to the specified shape and angle using lever/ pipe.
8. Apply basic ergonomic principles while cutting and bending of the reinforcement bars
9. Demonstrate the procedure of making stirrups, chairs and hanger bars

Unit 4.1: Cutting and Bending of Rebar

Unit Objectives

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

1. Explain the procedure of measuring, marking and cutting of reinforcement bars into simple shapes.
2. List the types of stirrups, chairs and hanger bar
3. Describe tolerance limit for cutting and bending of the reinforcement bar
4. Explain the importance of maintaining proper body posture while cutting and bending reinforcement bars
5. Demonstrate marking and cutting of rebar to the specified length using appropriate hand cutting tools.
6. Demonstrate marking and cutting of rebar to the specified length using appropriate power cutting tools.
7. Demonstrate bending of reinforcement bar to the specified shape and angle using lever/ pipe.
8. Apply basic ergonomic principles while cutting and bending of the reinforcement bars
9. Demonstrate the procedure of making stirrups, chairs and hanger bars

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information about the procedure of measuring, marking and cutting of reinforcement bars.

Say

In the previous session, we discussed the types of hand tools and power tools, their maintenance, and lifting gears and equipment used in reinforcement work. In this session, we shall learn about the procedure of measuring, marking and cutting of reinforcement bars into simple shapes.

Ask

- What is the meaning of rebar marking?

Elaborate

- Marking Rebar
- Cutting Rebar
- Stirrups, Chair Bars and Hanger Bar
- Ergonomics Principles

Notes for facilitation

- Initiate the session with the participants by discussing the objectives of the module.
- Make the session interactive by asking the participants to share their expectations from the module on the blackboard/whiteboard.
- Introduce the topics to be covered and give some information about them.
- Give the participants a general idea about what will be covered in the module.

Activity

- **Topic:** Tolerance limit
- **Purpose:** The purpose of this activity is to educate participants about tolerance limits in bar bending and cutting works during steel reinforcement installation in construction projects. Tolerance limits are critical to ensure the accuracy and structural integrity of reinforced concrete elements.
- **Resources:**
  - Presentation materials or slides explaining tolerance limits in bar bending and cutting.
  - Sample steel reinforcement bars with markings representing various tolerance limits.
- **Tentative Duration:** 60-90 minutes
- **Procedure:**
  - Introduction and Overview:
    - Begin by explaining the importance of tolerance limits in bar bending and cutting works in steel reinforcement installations.
    - Introduce the activity's objective: to understand the significance of meeting tolerance requirements to ensure the structural quality of reinforced concrete elements.
  - Presentation on Tolerance Limits:
    - Conduct a presentation or workshop covering the concept of tolerance limits in bar bending and cutting works.
    - Explain the permissible variations in dimensions, angles, and length that are acceptable

for steel reinforcement bars as per industry standards and codes.

- Divide Participants into Groups:
  - Divide participants into small groups of 3-5 members.
  - Assign each group specific reinforcement bar samples with markings representing different tolerance limits.
- **Understanding Tolerance Markings:**
  - Provide each group with the assigned steel reinforcement bar samples.
  - Instruct the groups to examine the tolerance markings on the bars and understand what they represent.
- **Research and Information Gathering:**
  - Encourage participants to research and gather information about the tolerance limits represented by the markings on their assigned reinforcement bars.
  - Provide them with relevant reinforcement code guidelines and specifications.
- **Group Discussions:**
  - Allow time for group discussions, where participants can collectively analyse the tolerance markings and interpret their meaning in the context of bar bending and cutting works.
- **Presentations:**
  - Ask each group to present their assigned reinforcement bar samples and explain the tolerance limits represented by the markings.
  - During the presentations, have each group discuss how meeting these tolerance limits ensures compliance with quality standards and contributes to the overall structural stability.
- **Real-World Scenarios:**
  - Present participants with real-world scenarios where adherence to tolerance limits is crucial for successful steel reinforcement installations.
  - Discuss the potential consequences of not meeting tolerance requirements on the structural integrity of reinforced concrete elements.
- **Comparison and Discussion:**
  - Facilitate a group discussion to compare and discuss the different tolerance limits presented by each group.
  - Encourage participants to share their insights and experiences related to meeting tolerance requirements in construction projects.

- **Conclusion:**
  - Summarize the activity by highlighting the importance of tolerance limits in bar bending and cutting works for steel reinforcement installations.

- Emphasize the need for precision and accuracy in these processes to ensure the quality and safety of the constructed structures.

- **Expected Outcome:** By the end of this activity, participants should have gained a clear understanding of tolerance limits in bar bending and cutting works. They should be familiar with the concept of permissible variations in dimensions and angles for reinforcement bars and comprehend the significance of meeting these tolerance requirements in construction projects. Additionally, participants should recognize how adherence to tolerance limits contributes to the overall structural integrity of reinforced concrete elements

Say

Did you find this activity interesting? Have you learned the importance of tolerance limit in bar bending works?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Exercise

Key Solutions to PHB Exercise

1.

i. Size and Shape Requirements
ii. Strength Requirements
iii. Corrosion Resistance
iv. Weldability
v. Cost
vi. Availability
vii. Sustainability

2.

Angle Grinder for Rebar
Rebar Cutting Saw (Circular Saw)

3.

Portable Rebar Bender

Bend & Cut Tool

4.

A stirrup is a closed loop of rebar found in a reinforced concrete component that keeps the main rebar together. Stirrups can be found in various types depending on the design and shape of the structural members.

5.

Chair reinforcement also known as chair bars are small structural element that are used to place reinforcement bars in position and maintain the appropriate space between the top and bottom reinforcements. Chair bars are primarily used in slab and footing. It's one of the most important parts of the raft foundations.

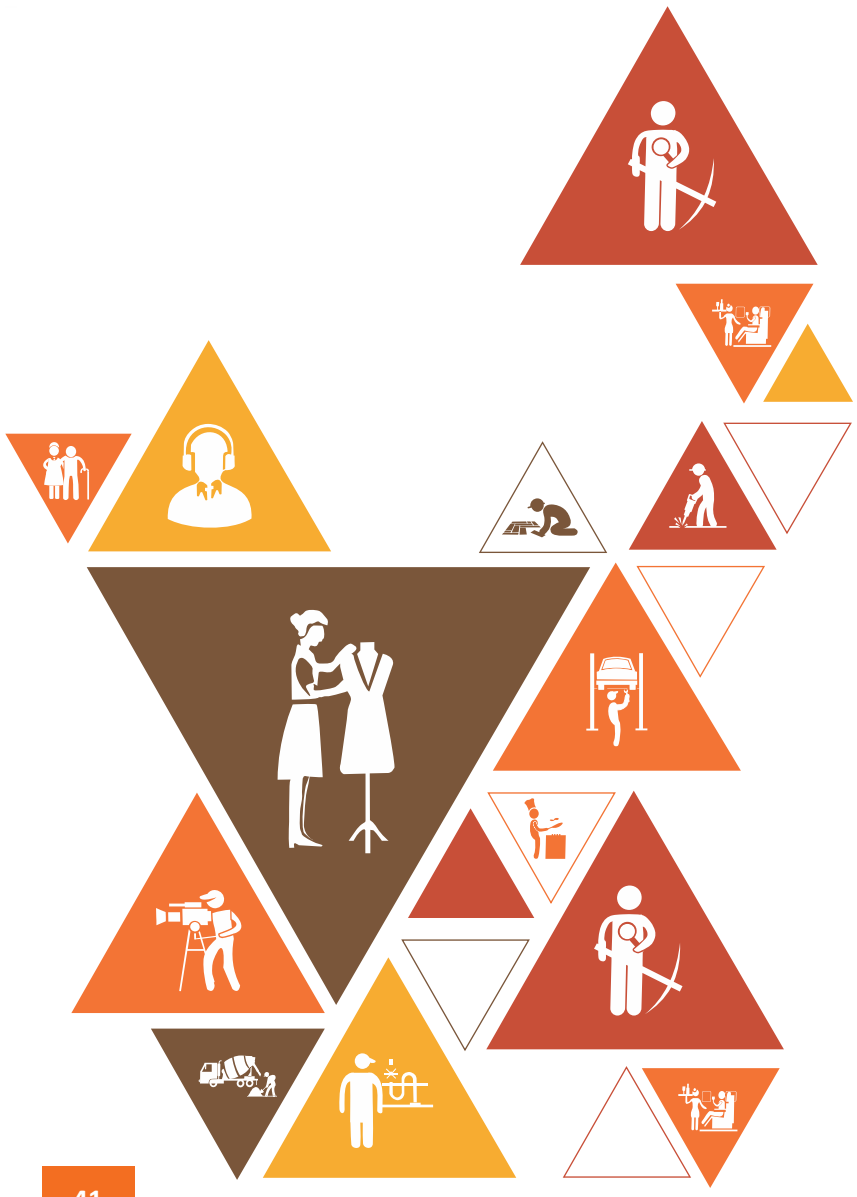
Parts of Chair Bar

I. Head of Chair

II. Height of Chair

III. Leg of Chair

Notes



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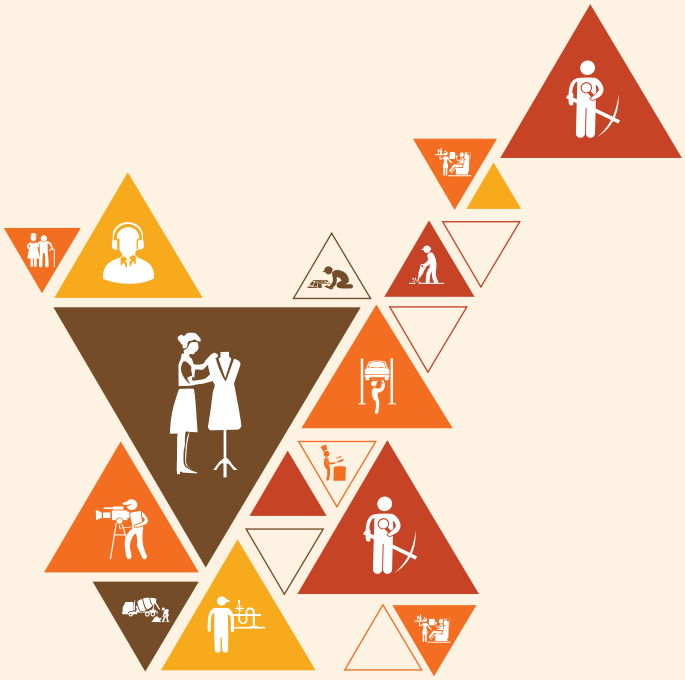
5. Fabrication, Placing and Fixing of Rebar

Unit 5.1 - Fabrication, Placing and Fixing of Rebar



CON/N0217

Key Learning Outcomes

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

1. List the different types of ties (Slash tie, ring slash tie, hair-pin tie, ring hair-pin tie, crown tie, lap tie) used in bar bending works
2. Describe the sequence for tying of reinforcement bar in case of in-situ and pre-fabricated cages
3. Explain the importance of lapping and staggering of reinforcement bars
4. Describe the standard method of staggering of reinforcement bars.
5. Explain use of chairs, hanger bar, spacer bar and cover blocks
6. Demonstrate placing and fixing of chairs as per requirement for the slab reinforcement.
7. Describe insertion and fixing sequence for footing, column, wall, beam and slab
8. Demonstrate insertion and fixing of rebar for column, slab, beam and wall.
9. Demonstrate fixing ties using hair pin tie, ring hair pin tie, slash tie, ring slash tie and crown tie.
10. Demonstrate marking, placing, fixing and tying of stirrups for column, beam, wall & slab as per the specified spacing.

Unit 5.1: Fabrication, Placing and Fixing of Rebar

Unit Objectives

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

1. List the different types of ties (Slash tie, ring slash tie, hair-pin tie, ring hair- pin tie, crown tie, lap tie) used in bar bending works
2. Describe the sequence for tying of reinforcement bar in case of in-situ and pre-fabricated cages
3. Explain the importance of lapping and staggering of reinforcement bars
4. Describe the standard method of staggering of reinforcement bars.
5. Explain use of chairs, hanger bar, spacer bar and cover blocks
6. Demonstrate placing and fixing of chairs as per requirement for the slab reinforcement.
7. Describe insertion and fixing sequence for footing, column, wall, beam and slab
8. Demonstrate insertion and fixing of rebar for column, slab, beam and wall.
9. Demonstrate fixing ties using hair pin tie, ring hair pin tie, slash tie, ring slash tie and crown tie.
10. Demonstrate marking, placing, fixing and tying of stirrups for column, beam, wall & slab as per the specified spacing.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information about the procedure of fabrication, placing and fixing of Rebar.

Say

In the previous session, we discussed the procedure of measuring, marking and cutting of reinforcement bars into simple shapes. In this session, we shall learn about the procedure of measuring, marking and cutting of reinforcement bars into simple shapes.

Ask

- What is the meaning of fabrication?
- Can you differentiate between in-situ and pre-fabricated cages?

Elaborate

- In-situ and pre-fabricated cages
- Different types of ties
- Tying of reinforcement bar
- Lapping and staggering of reinforcement bars
- Marking, placing, fixing and tying of stirrups

Notes for facilitation

- Initiate the session with the participants by discussing the objectives of the module.
- Make the session interactive by asking the participants to share their expectations from the module on the blackboard/whiteboard.
- Introduce the topics to be covered and give some information about them.
- Give the participants a general idea about what will be covered in the module.

Activity

- **Topic:** Bar Tying Works - Tie Types Demonstration
- **Purpose:** The purpose of this practical activity is to demonstrate and familiarize participants with different types of ties used in bar tying works for steel reinforcement
- **Resources:**
  - ♦ Steel reinforcement bars (rebar) of varying sizes.
  - ♦ Sample tie wire or binding material (e.g., thin wire or twine).
  - ♦ Visual aids or diagrams showing each type of tie.
- **Tentative Duration:** 45-60 minutes
- **Procedure:**
  - ♦ Introduction:
    - Begin by introducing the activity and its objective: to learn about different types of ties used in bar tying works during steel reinforcement installations.
    - Provide a brief overview of the significance of properly tying bars to ensure the structural integrity of reinforced concrete elements.
  - ♦ Presentation on Tie Types:

- Conduct a short presentation or visual demonstration showcasing the different types of ties used in bar tying works.
- Display visual aids or diagrams representing each type of tie and briefly explain their characteristics and applications.

♦ Divide Participants into Groups:

- Divide participants into small groups of 3-5 members.
- Assign each group one or two specific types of ties to focus on during the practical demonstration.

♦ Practical Demonstration:

- Provide each group with a set of steel reinforcement bars and the appropriate sample tie wire or binding material.
- Instruct each group to practice tying the assigned types of ties using the provided rebar and binding material.

♦ Hands-on Practice:

- Encourage participants to experiment with different techniques for each tie type, ensuring they understand how to create secure and effective ties.

♦ Group Discussions and Comparisons:

- Allow time for group discussions where participants can share their experiences and insights on tying different types of ties.
- Facilitate a comparison of the characteristics, advantages, and applications of each tie type within their respective groups.

♦ Presentations and Demonstrations:

- Ask each group to demonstrate the tying techniques they practiced for the assigned tie types.
- During the presentations, have each group explain the purpose and scenarios in which the specific tie types are commonly used.

♦ Real-World Examples:

- Present participants with real-world examples of construction projects where each tie type is applied, emphasizing the importance of using the appropriate tie for specific structural elements.

♦ Group Q&A and Feedback:

- Open the floor for a group Q&A session, allowing participants to seek clarification and ask questions about tie types and their applications.
- Gather feedback from participants on the effectiveness and challenges faced during the practical demonstration.

- **Conclusion:**
  - ♦ Summarize the activity by highlighting the significance of using the correct type of tie for different bar tying works in construction projects.
  - ♦ Reinforce the importance of properly securing reinforcement bars to ensure the structural stability and safety of reinforced concrete elements.
- **Expected Outcome:** By the end of this activity, participants should have gained practical experience in tying different types of ties used in bar tying works for steel reinforcement. They should be familiar with the characteristics, advantages, and applications of each tie type, allowing them to make informed decisions in construction projects involving bar tying works. Additionally, participants should understand the significance of correctly securing reinforcement bars to ensure the quality and safety of reinforced concrete structures,

Say

Did you find this activity interesting? Can you tie bars yourself using suitable tie?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Exercise

Key Solutions to PHB Exercise

1.

Rebar ties are small pieces of wire or plastic that are used to secure reinforcement bars (rebar) together in a reinforced concrete structure. Rebar ties are typically made of galvanized steel wire or plastic, and are designed to withstand the tension and pressure of the concrete pour.

2.

Lapping of rebar involves overlapping two or more pieces of rebar to create a continuous structural element. This is typically done to extend the length of a single bar, without having to use a longer, more expensive bar.

3.

Staggering of reinforcement bars is the process of spacing and positioning the bars in a reinforced concrete structure to optimize their strength and ensure proper load distribution. This is typically done to reduce the risk of cracking and to increase the overall durability and strength of the structure.

4.

a. **Chairs:** Chairs are small support structures that are placed on the formwork or subgrade and used to support reinforcement bars at the required height. They come in various shapes and sizes, such as circular or rectangular, and are typically made of plastic or metal. Chairs are important in ensuring that the reinforcement bars remain at the required height and distance from the formwork during concrete pouring and after the concrete has cured.

b. **Hanger bars:** Hanger bars are used to suspend reinforcement bars in a horizontal position. They are typically made of steel and are used in applications where it is not possible to place the reinforcement bars directly on the subgrade or formwork. Hanger bars can be attached to formwork or precast concrete elements to provide support to the reinforcement bars.

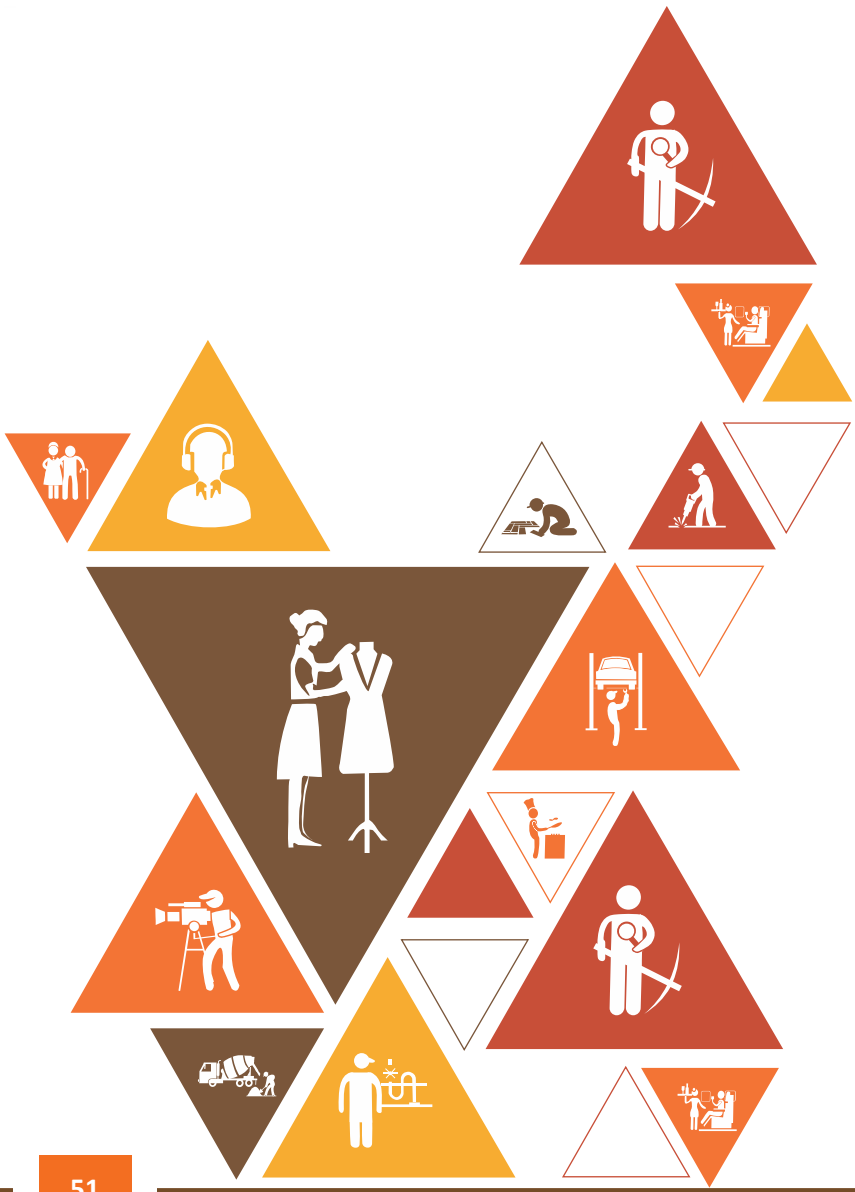
c. **Spacer bars:** Spacer bars are used to maintain a specific distance between two reinforcement bars. They come in various shapes and sizes, such as U-shaped or rectangular, and are typically made of plastic or metal. Spacer bars are used to ensure that the reinforcement bars remain in the correct position during concrete pouring and after the concrete has cured. They are also important in ensuring that the concrete cover over the reinforcement bars is maintained at the correct thickness, which is critical for protecting the reinforcement bars from corrosion.

d. **Cover blocks:** Cover blocks are used to keep the concrete cover over reinforcement bars at the right thickness. They are typically made of concrete or plastic and are placed at regular intervals on the formwork or subgrade. Cover blocks are used to prevent the reinforcement bars from coming into direct contact with the environment, which can lead to corrosion, and to ensure that the concrete cover over the reinforcement bars is maintained at the required thickness.

5. Match the following:

A	B
Slash tie	
Ring slash tie	
Hair-pin tie	
Ring hair-pin tie	
Crown tie	
Lap tie	

Notes



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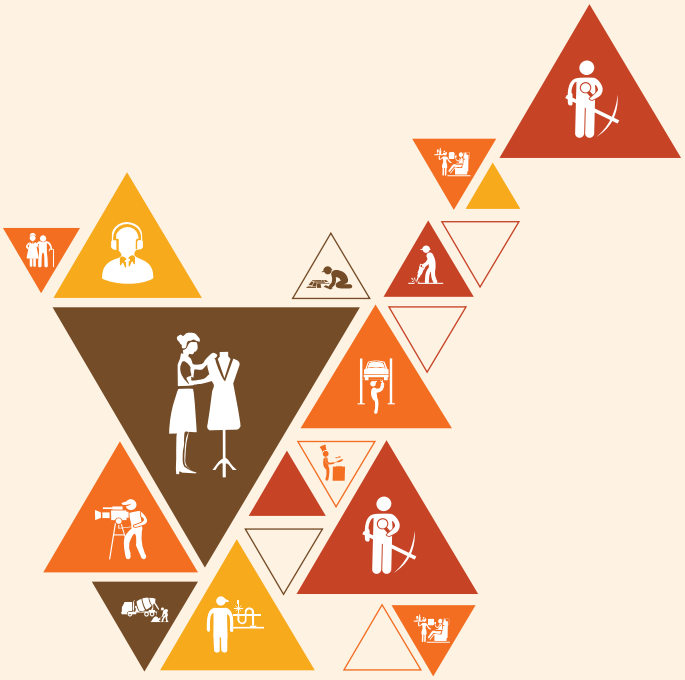
6. Erect and Dismantle Temporary Scaffold

Unit 6.1 Erect and Dismantle a Scaffold



CON/N0101

Key Learning Outcomes

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

1. Identify different components of scaffold.
2. List tools, materials components required for erection of 3.6 meter scaffold.
3. Erect a temporary scaffold up to 3.6 metres height.
4. Dismantle and stack a temporary scaffold up to 3.6 metres height.

Unit 6.1: Erect and dismantle a scaffold

Unit Objectives

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

1. Explain scaffolding and its purpose
2. List the common materials and tools used for erection of scaffolding (pipe, cup lock (vertical and ledgers), H- frames, bamboo and balli
3. List the functions of different hand tools like hammer, spanner, pulleys, hooks, ropes, etc., used for erection/ dismantling of scaffolds
4. List the visual checks to be carried out on the scaffolding components to ascertain their usability
5. Identify different components of a temporary scaffolding such as base, toe board, guard rails, platform, walkways, ladder and so on
6. Explain the functions of materials, components and accessories used in scaffolding
7. Demonstrate preparation of scaffolding base
8. Explain the methods adopted for the erection of the scaffold to ensure its safety
9. Demonstrate erection of a scaffold up to 3.6 m height using pipes and couplers/ cup lock system/ H frame employing appropriate hand tools
10. Explain various checks to be done on completion of erection of scaffolds, such as verticality check, stability check etc.
11. Demonstrate the checks required for verticality, rigidity and stability during erection of scaffold.
12. Explain the sequence and standard procedure of dismantling and stacking of scaffold
13. Demonstrate the dismantling of the erected scaffold.
14. Demonstrate the stacking of material, components, tools and accessories during erection and after dismantling.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computers, projectors, flipcharts etc.
- PowerPoint slides, pictures/posters depicting erection and dismantling of scaffolding.

Say

In this session, we shall learn about scaffolding and its purpose, common materials and tools used for erection and dismantling of scaffolding, visual checks to be carried out on the scaffolding, erection of a scaffold (up to 3.6 m height) using pipes and couplers, etc.

Ask

- Does anyone know what is scaffolding?
- What do you know about erection and dismantling of scaffolding?

Elaborate

In this unit, we will discuss the following topics:

- Scaffolding
- Uses of Scaffold
- Scaffolding Components
- Scaffolding Materials
- Scaffolding Erection and Dismantle
- Hand Tools used in Erection/Dismantle
- Safety Checks
- Safety Check before Dismantling
- Dismantling the Scaffold

Demonstrate

Use a projector and show the following YouTube video- https://youtu.be/VQ1e0VZmTmM to participants on how to erect a scaffold.

Activity

- **Purpose:** The purpose of this practical activity is to demonstrate and familiarize participants with the proper procedures for erecting and dismantling a scaffold safely and efficiently.
- **Resources Required:**
  - A small-scale scaffold structure or scaffold components for demonstration.
  - Safety equipment (e.g., helmets, safety harnesses, gloves).
  - Visual aids or diagrams depicting the steps involved in scaffold erection and dismantling.

- **Tentative Duration:** 60-90 minutes
- **Procedure:**

1. **Introduction and Safety Briefing:**
    - Begin by introducing the activity and its objective: to learn the correct procedures for safely erecting and dismantling a scaffold.
    - Conduct a safety briefing, emphasizing the importance of using personal protective equipment (PPE) and following safety guidelines throughout the activity.
2. **Presentation on Scaffold Erection and Dismantling:**
    - Conduct a presentation or visual demonstration showcasing the step-by-step procedures for scaffold erection and dismantling.
    - Use visual aids or diagrams to illustrate each stage of the process.
3. **Divide Participants into Groups:**
    - Divide participants into small groups of 3-5 members.
    - Assign each group specific stages of scaffold erection and dismantling to focus on during the practical demonstration.
4. **Scaffold Erection Demonstration:**
    - Provide each group with the scaffold components required for their assigned stages of scaffold erection.
    - Instruct each group to demonstrate the proper procedures for erecting their portion of the scaffold.
5. **Hands-on Practice:**
    - Allow participants to practice erecting and securing the scaffold components under the supervision of instructors.
    - Emphasize the importance of accuracy and stability during the erection process.
6. **Group Discussions and Comparisons:**
    - Facilitate group discussions where participants can share their experiences and insights on scaffold erection.
    - Encourage each group to compare and discuss their approaches to ensure a comprehensive understanding of the entire process.
7. **Scaffold Dismantling Demonstration:**
    - Provide each group with the scaffold components required for their assigned stages of scaffold dismantling.
    - Instruct each group to demonstrate the proper procedures for safely dismantling their portion of the scaffold.
8. **Hands-on Practice (Dismantling):**

- Allow participants to practice dismantling the scaffold components while following the correct procedures and safety guidelines.

9. Group Discussions and Feedback:

- Conduct a group discussion to gather feedback from participants on the challenges faced and lessons learned during scaffold erection and dismantling.
- Address any questions or concerns raised during the activity.

10. Conclusion:

- Summarize the activity by emphasizing the importance of following proper procedures and safety guidelines when erecting and dismantling scaffolds.
- Reinforce the significance of teamwork, communication, and attention to detail in scaffold erection and dismantling processes.

- **Expected Outcome:** By the end of this activity, participants should have gained practical experience in safely erecting and dismantling a scaffold. They should be familiar with the step-by-step procedures and safety considerations involved in scaffold construction and dismantling. Additionally, participants should understand the importance of teamwork, coordination, and adherence to safety guidelines in scaffold erection and dismantling to ensure the safety and efficiency of construction projects.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topics
- Arrange audio-visual aids for a better understanding of the topics.
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Exercise

Key Solutions to PHB Exercise

1. Scaffolding is a temporary structure used in construction, maintenance, or repair work to provide a platform for workers and materials. Its main purpose is to offer a safe and stable working platform at elevated heights, allowing workers to access hard-to-reach areas on buildings or structures. Scaffolding is crucial for ensuring worker safety and facilitating efficient work processes.
2. Five common scaffolding components include:
    - Standards (upright vertical posts)
    - Ledgers (horizontal members connecting the standards)
    - Transoms (horizontal members placed across ledgers)
    - Braces (diagonal members used to stabilize the scaffold)
    - Scaffold planks (platforms where workers stand or place materials)
3. Steps for dismantling the scaffold: i. Remove all workers and materials from the scaffold. ii. Start at the highest level and remove planks, transoms, and ledgers, working downward. iii. Once each level is clear, dismantle the standards, ensuring they are released gradually and not allowed to drop. iv. After dismantling, organize and store the components properly for future use or transport them safely to another location.
4. Hand tools used in the erection or dismantling of scaffolds include:
    - **Scaffold wrench or spanner:** For tightening or loosening scaffold fittings.
    - **Hammer:** For securing scaffold components and driving wedges.
    - **Spirit level:** To ensure the scaffold is level and plumb.
    - **Tape measure:** For accurate measurements during assembly.
    - **Scaffold belt:** A tool belt used to carry small tools and equipment while working on the scaffold.

Notes

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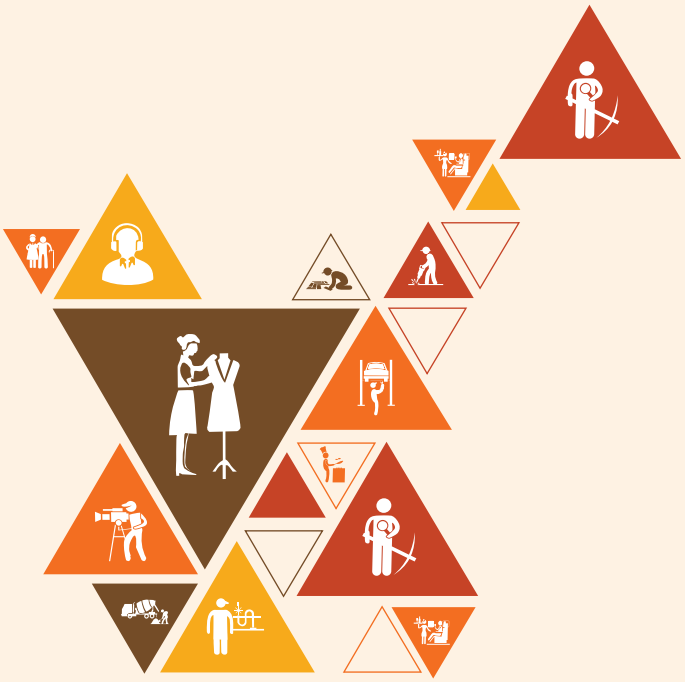
7. Work Effectively in a Team

Unit 7.1 - Work effectively in a team



CON/N8001

Key Learning Outcomes

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

1. Demonstrate effective communication with co-workers, superiors and sub-ordinates across different teams
2. Provide support to co-workers, superiors and sub-ordinates within the team and across interfacing teams to ensure effective execution of assigned task.

Unit 7.1: Effective Interaction and Communication

Unit Objectives

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

1. Demonstrate effective communication skills while interacting with co-workers, trade seniors and others during the assigned task.
2. Interpret work sketches, formats, permits, protocols, checklists and other work-related requirements which are to be conveyed to other team members
3. Demonstrate effective reporting to seniors while performing the assigned work as per applicable organisational norms
4. Explain effects and benefits of timely actions relevant to bar bending works with examples
5. Explain importance of team work and its effects relevant to bar bending works with examples
6. Demonstrate team work skills during assigned task.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computers, projectors, flipcharts etc.
- PowerPoint slides, pictures/posters depicting effective interaction and communication at the workplace.

Say

In this session, we shall learn about the importance of the effect and benefit of timely actions relevant to bar bending and steel fixing works, the importance of teamwork and its effects relevant to bar bending and steel fixing works, proper and effective communication and its adverse effects, effective communication skills while interacting with various stakeholders, etc.

Demonstrate

Use a projector and show the following link- https://www.youtube.com/watch?v=sEzTXTRo9L4 to participants on how to build effective communication skills.

Ask

- Does anyone know the Cs of effective communication?
- Why do you think it is important for an assistant bar bender and steel fixer to learn about effective communication?

Elaborate

In this unit, we will discuss the following topics:

- Time Management
- Effective Communication
- Workplace Communication
- Effective Communication with Stakeholders
- Adverse Effects of Poor Communication
- Teamwork at Workplace
- C's of Teamwork
- Enhancing Teamwork in the Workplace
- Construction Reporting
- Interpreting Scope of Bar bending and steel fixing Works

Activity

- **Purpose:** The purpose of this activity is to help students understand and practice effective communication skills.
- **Resources Required:** Whiteboard, markers, printed scenarios, timer, and notebooks.
- **Tentative Duration:** 60 minutes
- **Procedure:**
  - ♦ Introduce the importance of communication.
  - ♦ Provide communication scenarios to small 4-5 groups.

Scenario 1: Safety Briefing for New Workers

You are the site supervisor on a construction project, and several new workers have joined the team. The challenge is to conduct a safety briefing for the new workers, ensuring they understand the potential hazards on the site, safety protocols, and the proper use of personal protective equipment (PPE).

Scenario 2: Communicating Changes in the Construction Plan

During a construction project, unexpected challenges arise, leading to changes in the initial plan. As the project manager, you need to communicate these changes to the entire construction team effectively, addressing their concerns and ensuring everyone is on the same page to avoid delays

and confusion.

- Groups discuss and come up with solutions.
- Groups perform role-plays of scenarios.
- Provide feedback after each role-play.

Note: Trainer can introduce more similar scenarios

- **Expected outcome:** By the end of this practical activity, students are expected to achieve the following:

1. Improved understanding of effective communication.
2. Application of knowledge in real-life scenarios.
3. Ability to adapt communication style.
4. Enhanced collaboration and teamwork.
5. Increased confidence in communication skills.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic.
- Arrange audio-visual aids to make them understand effective communication at the workplace- https://youtu.be/V1RQG1nB4Kg
- Ask the participants if they have any questions.
- Encourage other participants to answer those questions and encourage peer learning in the class.

Exercise

Key Solutions to PHB Exercise

1. The 7 Cs of effective communication are clear, concise, concrete, correct, coherent, complete, and courteous.
2. Poor communication in construction projects leads to several issues:
    1. Creating Confusion
    2. Unnecessary Delays
    3. Budget/Cost Overruns
    4. Injuries and Safety Issues
    5. Issues with Stakeholders
3. Every workplace organisation requires communication for day-to-day business, regardless of size, location, goals, etc. It forms a bridge between people to exchange ideas, inform, express their feelings, influence others, etc. Communication is required to communicate within the organisation with managers and employees, etc. and outside with suppliers, buyers, etc.
4. The teamwork can be enhanced in the workplace by following:
    1. Concentrate more on “us” than “me”
    2. Communicate Explicitly
    3. Delegate and believe
    4. Establish shared aims and objectives
    5. Recognize and honour the achievements of others.
    6. Conquer a conflict with success
    7. Build a diverse group
    8. Believe in Team Building
5. The benefits of time management skills to both the person and the company are:
    1. Enhanced productivity and performance
    2. Providing work on schedule
    3. Less anxiety and stress
    4. Better-quality work
    5. Boosts confidence
    6. Reduces procrastination and wasted time
    7. Enhances the work-life balance
    8. Make better decisions

Notes

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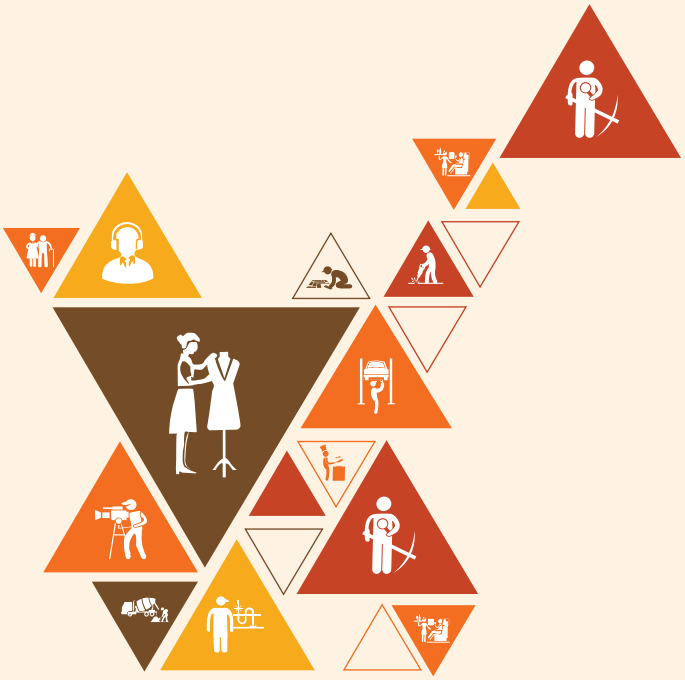
8. Work According to Personal Health, Safety and Environment Protocol

Unit 8.1 - Workplace Hazards

Unit 8.2 - Fire Safety

Unit 8.3 - Safety Measures at Workplace



CON/N0101

Key Learning Outcomes

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

1. Explain the types of hazards at the construction sites
2. Identify the hazards specific to the bar bending and steel fixing work
3. Recall the safety control measures and actions to be taken under emergency situation
4. Explain the classes of fire and types of fire extinguishers
5. Demonstrate the operation of fire extinguisher.
6. Demonstrate different methods involved in providing First aid to the affected person.
7. Explain the importance of worker participation in safety/mock drills
8. Demonstrate the use of all Personal Protective Equipment (PPE) like helmet, safety shoe, safety belt, safe jackets and other safety equipment relevant to bar bending work
9. Explain the reporting procedure to the concerned authority in case of emergency situations
10. Describe the standard procedure for handling, storing and stacking of material, tools, equipment and accessories
11. Explain different types of wastes produced at a construction site including their disposal method
12. Explain the purpose and importance of vertigo test at construction site
13. Demonstrate vertigo test
14. List out basic medical tests required for working at construction site.
15. Explain the types of ergonomic principles adopted while carrying out specific task at the construction
16. Explain the types and benefits of basic ergonomic principles, which should be adopted while carrying out specific task at the construction sites.
17. Explain the benefits of basic ergonomic principles used at construction sites.
18. Explain the importance of housekeeping
19. Demonstrate housekeeping practice followed after reinforcement works

Unit 8.1: Workplace Hazards

Unit Objectives

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

1. Explain the types of hazards at the construction sites
2. Identify the hazards specific to the bar bending and steel fixing work
3. Recall the safety control measures and actions to be taken under emergency situation.
4. Explain the reporting procedures adopted during emergency situations.
5. Describe the standard procedure for handling, storing and stacking of material, tools, equipment and accessories.
6. Explain the types of ergonomic principles adopted while carrying out specific task at the construction
7. Explain the benefits of basic ergonomic principles used at construction sites
8. Demonstrate the use of all Personal Protective Equipment (PPE) like helmet, safety shoe, safety belt, safe jackets and other safety equipment relevant to bar bending work.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computers, projectors, flipcharts etc.
- PowerPoint slides, pictures/posters depicting the types of hazards at the construction sites, use of PPEs as per work requirements during the bar bending and steel fixing job, etc.

Say

In this session, we shall learn about the importance of the types of hazards at the construction sites and identify the hazards, standard procedure for handling, storing and stacking of material, tools, equipment and accessories, PPEs as per work requirements during bar bending and steel fixing jobs, safety control measures and actions to be taken under an emergency situation, the types and benefits of basic ergonomic principles, etc.

Ask

- Does anyone know the types of hazards at the construction sites?
- Why do you think it is important to use PPEs as per work requirements during construction jobs?

Elaborate

In this unit, we will discuss the following topics:

- Workplace Safety
- Workplace Safety at Construction Site
- Workplace Hazards
- Workplace Hazard at Construction Site
- Hazard Identification and Risk Assessment (HIRA)
- Workplace Warning Signs
- Personal Protective Equipment
- Basic Ergonomic Principles
- Emergency Response Plan for Construction Site

Demonstrate

Use a projector and show the following YouTube video- https://youtu.be/VQ1e0VZmTmM to participants on how to erect a scaffold.

Activity

- **Purpose:** The purpose of this practical activity is to educate students about the importance of Personal Protection Equipment (PPE) used at construction sites.
- **Resources Required:** Various PPE (e.g., hard hat, safety goggles, earplugs, dust masks, reflective vests, gloves, and safety boots), hazard posters, and safety guidelines.
- **Tentative Duration:** 60-90 minutes
- **Procedure:**
    - Introduction: Discuss workplace safety and PPE's significance.
    - Hazard Awareness: Identify construction site hazards.
    - Set up stations with examples of different types of PPE.
    - Divide the students into groups and assign each group to a station.
    - Instruct each group to inspect the PPE, discuss its purpose, and identify the types of hazards it protects against.

- Allow students to try on the PPE to experience how it fits and functions.
- Gather the students for a recap of the key points learned during the activity.
- Encourage questions and facilitate a Q&A session to address any remaining doubts.

- **Expected outcome:** The participants will understand PPE's importance, recognize hazards, and know how to use various PPE correctly.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topics
- Arrange audio-visual aids for a better understanding of the topics.
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Notes

Unit 8.2: Fire Safety

Unit Objectives

By 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.

Say

In this session, we shall learn about fire safety.

Ask

- What will you do if a fire breaks out in the workplace?
- What are the emergency situations?
- Explain the method of using a fire extinguisher.

Demonstrate

Demonstrate the step-by-step evacuation process to the participants; it should include:

- Detection
- Decision
- Alarm
- Reaction
- The movement to an area of refuge or an Assembly station
- Transportation

lso, explain these points, in brief, to make the participants more clear about the process of evacuation and ask them to jot down these points in their notes: -

Clear passageways to all escape routes

- Signage indicating escape routes should be marked.
- Enough exits and routes should be present to allow a large number of people to be evacuated quickly.
- Emergency doors that open easily.
- Emergency lighting where needed.

- A Training for all employees to know and use the escape routes.
- A safe meeting point or assembly area for staff.
- Instructions on not using the elevator during a fir

Elaborate

In this unit, we will discuss the following topics:

- Fire and its Classes
- Fire Safety
- Prevention of a Workplace Fire
- Fire Extinguisher

Say

Let us now participate in an activity to understand the concept better.

Activity

- **Purpose:** The purpose of this activity is to educate participants about the various safety signage at construction sites.
- **Resources Required:** Signage posters/PPT of the following:

- **Tentative Duration:** 60 minutes
- **Procedure:**
  - ♦ Show the PPT with various signs used in safety drills.
  - ♦ Later randomly select the participant and ask them to identify the signage.
- **Expected outcome:** The participant in this activity will be able to recall the various safety signage at construction sites.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topics
- Arrange audio-visual aids for a better understanding of the topics.
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Notes

Unit 8.3: Safety Measures at Workplace

Unit Objectives

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

1. Explain the importance of housekeeping works.
2. Demonstrate safe housekeeping practices.
3. Explain the importance of participation of workers in safety drills.
4. Explain the purpose and importance of vertigo test at construction site.
5. List out basic medical tests required for working at construction site.
6. Demonstrate vertigo test.
7. Demonstrate different methods involved in providing First aid to the affected person
8. Demonstrate safe waste disposal practices followed at construction site.
9. Explain different types of waste at construction sites and their disposal method.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computers, projectors, flipcharts etc.
- PowerPoint slides, pictures/posters depicting the steps in safety drills, different methods involved in providing First aid to the affected person, safe waste disposal practices followed at construction site, etc.

Say

In this session, we shall learn about the importance of housekeeping works, purpose and importance of vertigo test at construction site, basic medical tests required for working at construction site, different methods involved in providing First aid to the affected person, safe waste disposal practices, etc.

Ask

- Why do you think the safe housekeeping practices are important at construction site?
- Can you tell me how should the construction waste disposed of?

Elaborate

In this unit, we will discuss the following topics:

- Safety, Health and Environment at Work Place

- Good Housekeeping
- Safety Drills at Construction Site
- Medical Examination for Construction Workers
- Vertigo Test
- First Aid
- Treating Minor Cuts and Scrapes
- Waste Management

Activity

- **Purpose:** The participant will learn more about the first aid kits in this activity.
- **Resources Required:** Computer, internet.
- **Tentative Duration:** 1 Hour
- **Process:**
  - Divide participants into 5 groups and provide them with first aid kit essentials.
  - Ask them to surf the internet and explain the usage of each item included in the kit.
  - Alternatively show them a video about the usage and ask them to make notes.
  - Also, provide them cardboard, paper, scissors, glue stick, and colour pens to make the first aid box.
- **Estimated Outcome:** The participants will have detailed knowledge about first aid kits.

Notes for facilitation

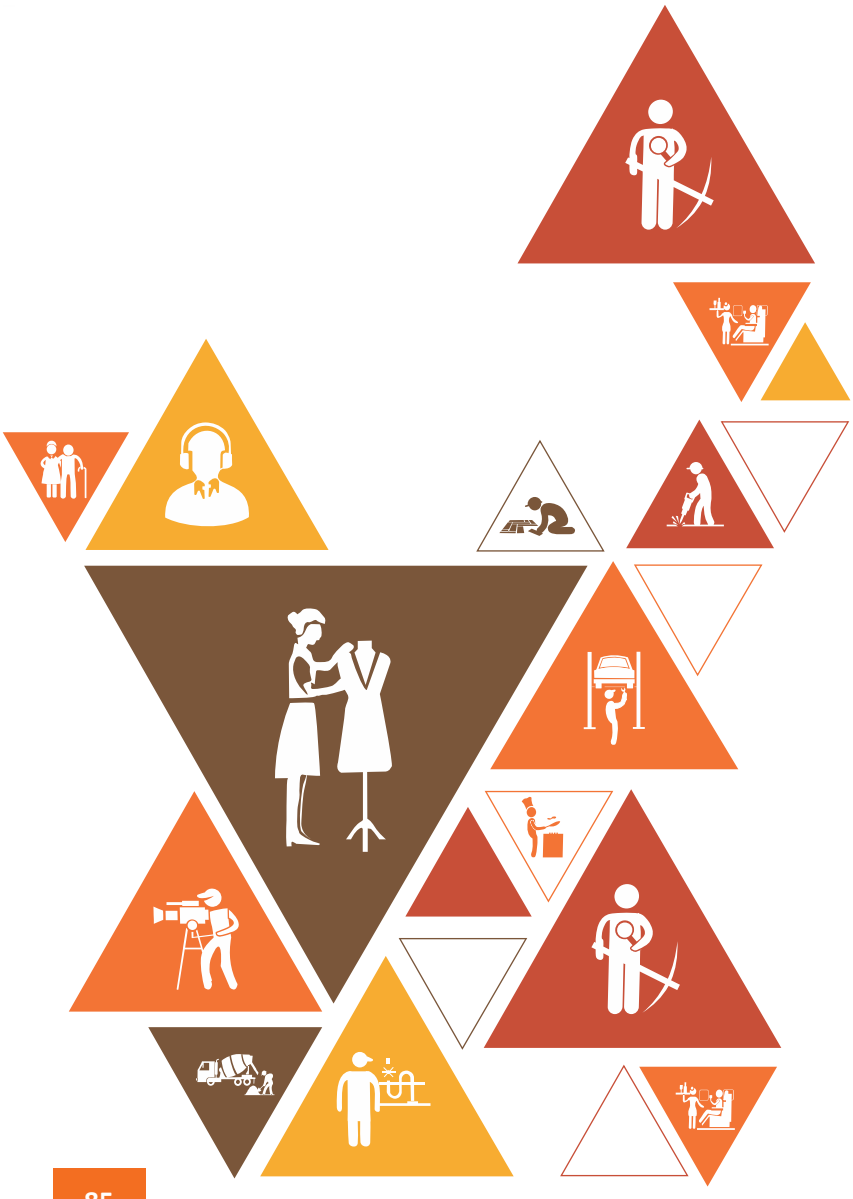
- Arrange the relevant handouts and leaflets for a better understanding of the topics
- Arrange audio-visual aids for a better understanding of the topics.
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Exercise

Key Solutions to PHB Exercise

1. There are five main types of fire extinguishers:
    1. Water.
    2. Powder.
    3. Foam.
    4. Carbon Dioxide (CO2)
    5. Wet chemical.
2. Personal protective equipment, or "PPE," is equipment worn to reduce exposure to risks that might result in significant occupational injuries or illnesses. Chemical, radiological, physical, electrical, mechanical, and other job dangers may cause these injuries and diseases.
3. The benefits of workplace safety are:
    - Employee retention increases if they are provided with a safe working environment.
    - Failure to follow OSHA's laws and guidelines can result in significant legal and financial consequences.
    - A safe environment enables employees to stay invested in their work and increases productivity.
    - Employer branding and company reputation can both benefit from a safe working environment.
4. Good housekeeping on construction sites refers to the practice of keeping the site clean and tidy. After all, construction work is messy, and cleaning up now will only result in more mess later. A clean work environment reduces the likelihood of accidents and improves fire safety. There are fewer things to trip you up if there are no materials, waste, or discarded tools.
5. Construction is a hazardous field in which employees must become proficient. Fortunately, safety training can reduce workplace injuries while informing employees of necessary precautions to take.

Notes



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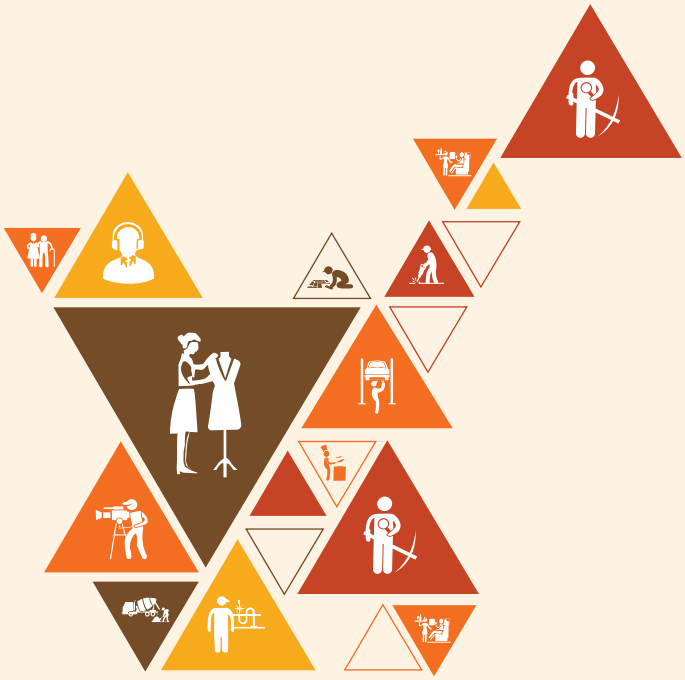
9. Employability Skills (30 Hours)

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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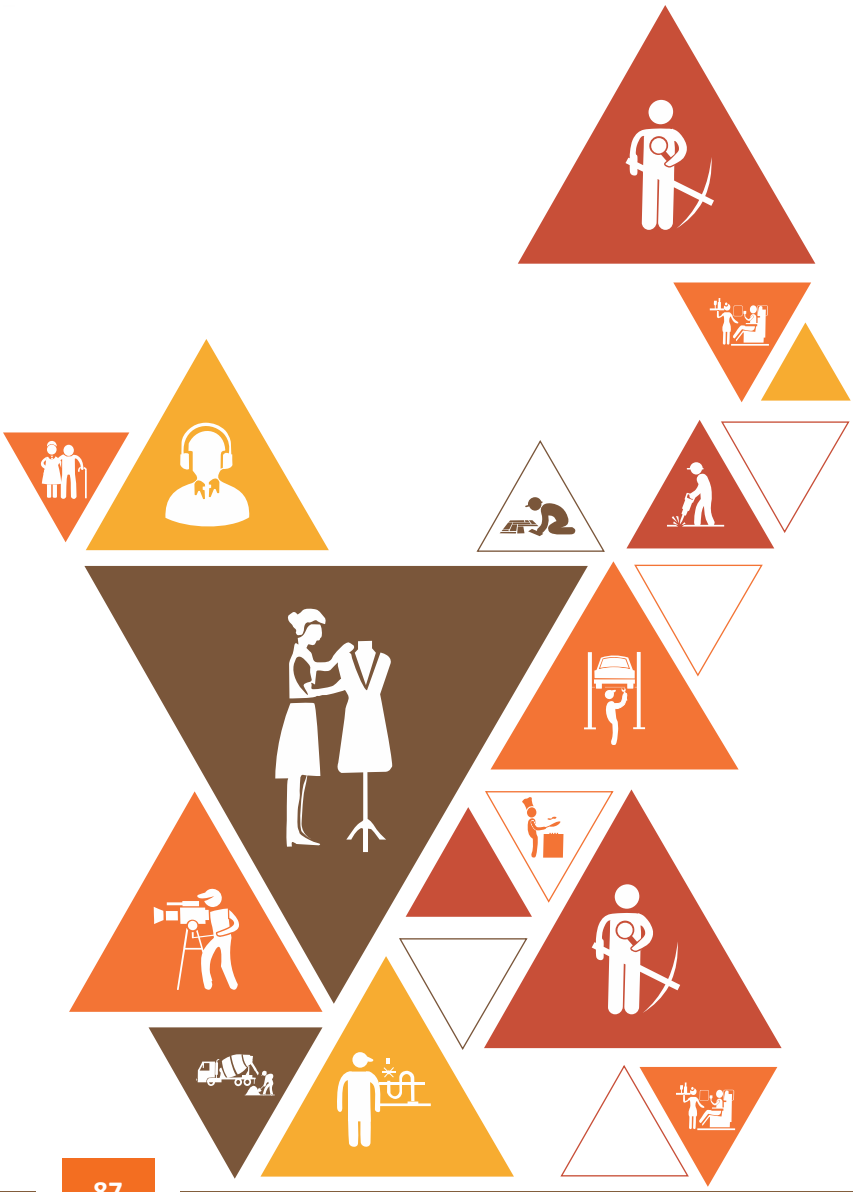

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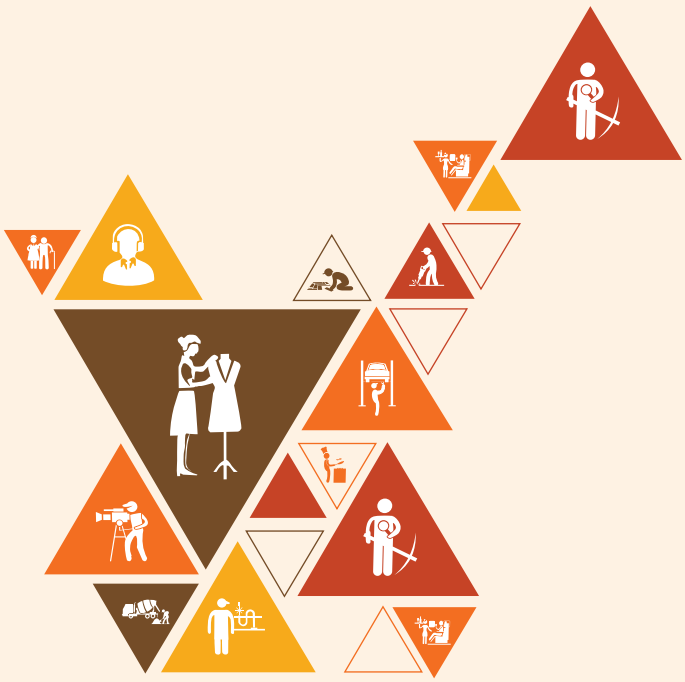
10. Annexures

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 Bar Bender and Steel Fixer**		
Qualification Pack Name & Ref. ID	CON/Q0202		
Version No.	4.0	**Version Update Date**	31-08-2023
Prerequisites to Training (if any)	**Minimum Educational Qualification:** 5th Class with 6-12 Months of experience as a certified Helper -Bar bender & steel fixer OR 5th Class with 1-2 Years of experience in case of a Non trained worker, in same occupation		
Training Outcomes	**After completing this program, participants will be able to:** • Interpret reinforcement bar detail from hand sketches • Use materials, tools, and equipment relevant to reinforcement works • Cut reinforcement bars and bend them manually into simple shapes • Fabricate, place, and fix reinforcement bar for pre-fabricated and in-situ RCC Structures • Erect and dismantle temporary scaffold up to 3.6 m height • Interact and communicate effectively with co-workers, superiors, and sub-ordinates across different teams • Follow safety norms as defined by the organization, and adopt healthy and safe work practices.		

S. no	Module name	Session name	Session objectives	NOS reference	Methodology	Training tools/ aids	Duration
1.	Introduction to bar bending and steel fixing occupation T- 08:00 (HH: MM)	1. Icebreaker	• Introduce each other and build rapport with fellow trainees and the trainer	Bridge Module	Classroom lecture, games, group participation, group activity	Training Kit- Trainer Guide, Presentations, White-board, Marker, Projector, Laptop	T- 00:30
		2. Roles and Responsibilities of Assistant Bar Bender and Steel Fixer	• Define the role of an assistant bar bender and steel fixer • Explain the personal attributes required to be an assistant bar bender and steel fixer • Recall the basic terms used in the occupation of bar bending and steel fixing • Discuss future possible progression and career options for assistant bar bender and steel fixer				T- 07:30
2.	Interpret Reinforcement Bar Detail from Hand Sketches T- 08:00 P- 24:00 (HH: MM)	1. Reinforcement Bar	• Describe the different types of reinforcement bars, their grade and standard size	CON/ N0214 PC1, PC2, PC3, PC4, PC5, PC6 KU1, KU2 KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU13, KU14, KU15, KU16, KU21, KU22			T- 02:00 P- 06:00
		2. Rebar Sketch	• Determine diameter, cutting length, cover, number and shape of reinforcement bars from hand sketch • Determine spacing details for stirrups, chairs, space bars etc. by interpreting hand sketches relevant to bar bending works.				T- 02:00 P- 06:00
		3. Basic Mathematics in Bar Bending and Fixing	• List different systems of linear measurement • Apply the basic knowledge of units, measurement and arithmetic calculation relevant to bar bending work				T- 02:00 P- 06:00

		4. Bar Bending Schedule	• Determine diameter, cutting length, cover, number and shape of reinforcement bars from hand sketch • Determine spacing details for stirrups, chairs, space bars etc. by interpreting hand sketches relevant to bar bending works.				T- 02:00 P- 06:00
3.	Use materials, tools, and equipment relevant to reinforcement works T- 12:00 P- 36:00 (HH: MM)	1. Rebar Installation	• Explain the process of rebar Installation • Classify the reinforcement bar with respect to their grade and size.	CON/ N0215 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11 KU1, KU2 KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU13, KU14, KU15, KU16, KU17, KU18, KU19, KU20	Classroom lecture, games, group participation, group activity	Training Kit- Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop Tools and Equipment Required: Chisel, Hammer, Bar tying hook, Bending lever, Gauge measure, Podger Spanner, Hack saw blade and frame, Steel scale, Try Scale, Spirit level, Plumb bob, Measurement tape, Cutting machine, Bending machine, Reinforcement bar tying machine, Lifting vention kit	T- 02:00 P- 06:00
		2. Cutting Rebar	• Demonstrate the use of hand tools for cutting rebars. • Demonstrate the use of power tools like circular cutting machine (handheld and table mounted) and shearing machine for cutting rebar. • Demonstrate the use of threading machine for marking threads on reinforcement bars.				T- 02:00 P- 06:00
		3. Bending Rebar	• Demonstrate the use of hand tools for bending rebars. • Demonstrate the use of power tools for bending rebar. • Demonstrate the use of bar bending machine				T- 02:00 P- 06:00
		4. Tying Rebar	• Differentiate binding wires based on materials and thickness				T- 02:00 P- 06:00
		5. Hand tools used in Reinforcement works	• Identify the different types of hand tools and power tools used for steel reinforcement works. • Demonstrate the use of hand tools for cutting rebars.				T- 02:00 P- 06:00

		6. Power tools used in Rein-force-ment works	• Identify the different types of hand tools and power tools used for steel reinforcement works. • Demonstrate the use of power tools like circular cutting machine (handheld and table mounted) and shearing machine for cutting rebar.			appliance (Sling, Shackle, Belts), Safety Hel-met, Safe-ty goggles, Safety shoes, Safety belt, Cot-ton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Pre	T- 02:00 P- 06:00
		7. Lifting Gears and Equip-ment	• Demonstrate the use of slings, shackles and lifting belts for lifting and shifting of rebar • Explain use of lifting gears and equipment used in reinforcement work				T- 02:00 P- 06:00
		8. Tools Safety	• State the importance of maintaining proper body postures while using hand and power tools • Describe the process adopted for care and maintenance of hand and power tools used in bar bending works.				T- 02:00 P- 06:00
4.	Cut rein-forcement bars and bend them manually in simple shapes T- 16:00 P- 40:00 (HH: MM)	1. Marking Rebar	• Explain the procedure of measuring, marking and cutting of reinforcement bars into simple shapes.	CON/ N0216 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11 KU1, KU2 KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU13, KU14, KU15, KU16, KU17, KU18,	Classroom lecture, games, group par-ticipation, group ac-tivity	Training Kit- Trainer Guide, Presen-tations, White-board, Marker, Projector, Laptop Tools and Equipment Required:	T- 02:00 P- 05:00

		2. Cutting Rebar	• Explain the procedure of measuring, marking and cutting of reinforcement bars into simple shapes. • Describe tolerance limit for cutting and bending of the reinforcement bar			T- 02:00 P- 05:00
		3. Bending Rebar	• Describe tolerance limit for cutting and bending of the reinforcement bar			T- 02:00 P- 05:00
		4. Stirrups	• List the types of stirrups, chairs and hanger bar • Demonstrate the procedure of making stirrups, chairs and hanger bars			T- 02:00 P- 05:00
		5. Chair Bar	• List the types of stirrups, chairs and hanger bar • Demonstrate the procedure of making stirrups, chairs and hanger bars			T- 02:00 P- 05:00
		6. Hanger Bar	• List the types of stirrups, chairs and hanger bar • Demonstrate the procedure of making stirrups, chairs and hanger bars			T- 02:00 P- 05:00
		7. Safe Use of Tools	• Explain the safe use of cutting power tools in construction			T- 02:00 P- 05:00
		8. Ergo-nomics	• Apply basic ergonomic principles while cutting and bending of the reinforcement bars			T- 02:00 P- 05:00

5.	Fabricate, place and fix reinforcement bar for pre- fabricated and in-situ RCC Structures T- 24:00 P- 62:00 (HH: MM)	1. Pre-fabricated Cages and In-situ Cages	• Describe the sequence for tying of reinforcement bar in case of in-situ and pre-fabricated cages	CON/N0217 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10 KU1, KU2 KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU13, KU14, KU15, KU16, KU17, KU18	Classroom lecture, games, group participation, group activity	Training Kit- Trainer Guide, Presentations, White-board, Marker, Projector, Laptop Tools and Equipment Required:	T- 03:00 P- 05:00
		2. Fabrication Process	• Describe The process of fabricating, placing, and fixing rebar				T- 03:00 P- 05:00
		3. Placing and Fixing Process	• Demonstrate placing and fixing of chairs as per requirement for the slab reinforcement. • Describe insertion and fixing sequence for footing, column, wall, beam and slab • Demonstrate insertion and fixing of rebar for column, slab, beam and wall. • Demonstrate fixing ties using hair pin tie, ring hair pin tie, slash tie, ring slash tie and crown tie. • Demonstrate marking, placing, fixing and tying of stirrups for column, beam, wall & slab as per the specified spacing.				T- 02:00 P- 06:00
		4. Fixing of Structural Elements	• Demonstrate placing and fixing of chairs as per requirement for the slab reinforcement. • Describe insertion and fixing sequence for footing, column, wall, beam and slab • Demonstrate insertion and fixing of rebar for column, slab, beam and wall. • Demonstrate fixing ties using hair pin tie, ring hair pin tie, slash tie, ring slash tie and crown tie.				T- 02:00 P- 06:00

			• Demonstrate marking, placing, fixing and tying of stirrups for column, beam, wall & slab as per the specified spacing.				
		1. Support and Spacing Elements	• Explain use of chairs, hanger bar, spacer bar and cover blocks				T- 02:00 P- 06:00
		2. Rebar Ties	• List the different types of ties (Slash tie, ring slash tie, hair-pin tie, ring hair- pin tie, crown tie, lap tie) used in bar bending works • Describe the sequence for tying of reinforcement bar in case of in-situ and pre-fabricated cages				T- 02:00 P- 06:00
		3. Stirrups	• Demonstrate marking, placing, fixing and tying of stirrups for column, beam, wall & slab as per the specified spacing.				T- 02:00 P- 06:00
		4. Lapping of Reinforcement Bar	• Explain the importance of lapping and staggering of reinforcement bars				T- 02:00 P- 06:00
		5. Staggering of Reinforcement Bar	• Explain the importance of lapping and staggering of reinforcement bars • Describe the standard method of staggering of reinforcement bars.				T- 02:00 P- 06:00
		6. Splicing of Rebar	• Describe the standard method of splicing of reinforcement bars.				T- 02:00 P- 05:00

			• Demonstrate marking, placing, fixing and tying of stirrups for column, beam, wall & slab as per the specified spacing.				
		5. Support and Spacing Elements	• Explain use of chairs, hanger bar, spacer bar and cover blocks				T- 02:00 P- 06:00
		6. Rebar Ties	• List the different types of ties (Slash tie, ring slash tie, hair-pin tie, ring hair- pin tie, crown tie, lap tie) used in bar bending works • Describe the sequence for tying of reinforcement bar in case of in-situ and pre-fabricated cages				T- 02:00 P- 06:00
		7. Stirrups	• Demonstrate marking, placing, fixing and tying of stirrups for column, beam, wall & slab as per the specified spacing.				T- 02:00 P- 06:00
		8. Lapping of Reinforcement Bar	• Explain the importance of lapping and staggering of reinforcement bars				T- 02:00 P- 06:00
		9. Staggering of Reinforcement Bar	• Explain the importance of lapping and staggering of reinforcement bars • Describe the standard method of staggering of reinforcement bars.				T- 02:00 P- 06:00
		10. Splicing of Rebar	• Describe the standard method of splicing of reinforcement bars.				T- 02:00 P- 05:00
		11. Insertion and fixing sequence for footing, column, wall, beam and slab	• Describe insertion and fixing sequence for footing, column, wall, beam and slab • Demonstrate insertion and fixing of rebar for column, slab, beam and wall.				T- 02:00 P- 05:00

6.	Erect and dismantle temporary scaffold up to 3.6-meter height T- 12:00 P- 36:00 (HH: MM)	1. Scaffolding	• Explain scaffolding and its purpose	CON/0101 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12 KU1, KU2 KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU13, KU14, KU15, KU16, KU17,	Classroom lecture, games, group participation, group activity	Training Kit- Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop Tools and Equipment Required:	T- 02:00 P- 06:00
		2 Components of Scaffolding Components of Scaffolding	• Identify different components of a temporary scaffolding				T- 02:00 P- 06:00
		3. Scaffolding Erection	• List the common materials and tools used for erection of scaffolding (pipe, cup lock (vertical and ledgers), H-frames, bamboo and ballis • Demonstrate erection of a scaffold up to 3.6 m height				T- 02:00 P- 06:00
		4. Tools used in Erection/ Dismantle	• List the functions of different hand tools like hammer, spanner, pulleys, hooks, ropes, etc., used for erection/ dismantling of scaffolds				T- 02:00 P- 06:00
		5. Safety Checks in Scaffolding	• List the visual checks to be carried out on the scaffolding components to ascertain their usability • Explain various checks to be done on completion of erection of scaffolds, such as verticality check, stability check etc. • Demonstrate the checks required for verticality, rigidity and stability during erection of scaffold				T- 02:00 P- 06:00
		6. Scaffolding Dismantle	• Explain the sequence and standard procedure of dismantling and stacking of scaffold • Demonstrate the dismantling of the erected scaffold				T- 02:00 P- 06:00

7.	Work effectively in a team to deliver desired results at the workplace T- 08:00 P- 16:00 (HH: MM)	1. Time management	• Explain effect and benefit of timely actions relevant to bar bending and steel fixing works with examples.	CON/ N8001 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9	Classroom lecture, games, group participation, group activity, field visit	Training Kit- Trainer Guide, Presentations, White-board, Marker, Projector, Laptop	T- 02:00 P- 04:00
		2. Effective communication	• Explain importance of proper and effective communication and its adverse effects in case of failure of proper communication. • Demonstrate effective communication skills while interacting with co-workers and trade seniors during the assigned task.				T- 02:00 P- 04:00
		3. Team work and effective reporting	• Explain importance of team work and its effects relevant to bar bending and steel fixing works with examples. • Demonstrate team work during assigned task. • Demonstrate effective reporting to seniors as per applicable organisational norms. • Instruct subordinates in a clear and precise manner with respect to bar bending and steel fixing works.				T- 02:00 P- 04:00
		4. Construction drawings	• Interpret work sketches bar bending and steel fixing works formats, permits, protocols, checklists etc. • Interpret scope of bar bending and steel fixing works.				T- 02:00 P- 04:00

8.	Work according to personal health, safety and environment protocol at construction site T- 16:00 P- 32:00 (HH: MM)	1. Workplace hazards	• Explain the types of hazards at the construction sites and identify the hazards specific to the domain related works. • Describe the standard procedure for handling, storing and stacking of material, tools, equipment and accessories.	CON/ N9001 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14, KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU14	Classroom lecture, games, group participation, group activity, field visit	Training Kit- Trainer Guide, Presentations, White-board, Marker, Projector, Laptop Tools and Equipment Required: Safety Helmets, Face shield, Overalls, Knee pads, Safety shoes, Safety belts, Safety harness, Safety Gloves, Safety goggles, Particle masks, Ear Plugs, Reflective jackets, Fire Extinguisher, Fire prevention kit, First Aid box, Safety tags, Safety Notice board	T- 03:00 P- 05:00
		2. Use of PPEs and emergency situation	• Use PPEs as per work requirements during bar bending and steel fixing job. • Recall the safety control measures and actions to be taken under emergency situation.				T- 03:00 P- 05:00
		3. Reporting and basic ergonomic principles	• Explain the reporting procedure to the concerned authority in case of emergency situations. • Explain the types and benefits of basic ergonomic principles, which should be adopted while carrying out specific task at the construction sites.				T- 03:00 P- 05:00
		4. Fire safety	• Explain the classes of fire and types of fire extinguishers. • Demonstrate the operating procedure of the fire extinguishers.				T- 03:00 P- 05:00
		5. Safety measures at workplace	• Explain the importance of housekeeping works. • Demonstrate safe housekeeping practices. • Explain the importance of participation of workers in safety drills. • Explain the purpose and importance of vertigo test at construction site.				T- 03:00 P- 05:00

		6. Medical tests and waste disposals	• List out basic medical tests required for working at construction site. • Demonstrate vertigo test. • Demonstrate different methods involved in providing First aid to the affected person • Demonstrate safe waste disposal practices followed at construction site. • Explain different types of waste at construction sites and their disposal method.				T- 01:00 P- 07:00
9.	Employability Skills (30 hours)	1. Introduction to Employability Skills	• Describe the importance of Employability Skills • Prepare a note on different industries, trends, required skills	DGT/VSQ/N0101	Classroom lecture, discussion, Demonstration, practical, Team Activity: Role play, video session	Training Kit- Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	01:00
		2. Constitutional values - Citizenship	• Detail the principles of the Constitution of India • Identify the various environmentally sustainable practices				01:00
		3. Becoming a Professional in the 21st Century	• Discuss relevant 21st century skills required for employment. • Practice critical thinking and decision making skill				01:00
		4. Basic English Skills	• Read English text with appropriate articulation. • Practice English words, sentences and punctuation.				02:00
		5. Communication Skills	• Explain the importance of communication at workplace. • Demonstrate effective communication strategies • Demonstrate how to communicate effectively using verbal and nonverbal communication				04:00

		6. Diversity & Inclusion	• Explain the need of diversity at workplace • Identify the various PwD policies applicable at workplace • Discuss the significance of PSH Act				01:00
		7. Financial and Legal Literacy	• Discuss various financial institution, products and services • Explain the common component of salary such as Basic, PF, Allowances (HRA, TA, DA, etc.), Tax				04:00
		8. Essential Digital Skills	• Detail the use and features of various MS Office tools, like MS Word, MS Excel, MS PowerPoint, etc. • Demonstrate how to operate digital devices • Create an email id and follow e-mail etiquette to exchange e -mails • Describe the role of digital technology in day-to- day life and the workplace				03:00
		9. Entrepre-neurship	• Describe the types of entrepreneurship and enterprises • Describe the 4Ps of Marketing- Product, Price, Place and Promotion and apply them as per requirement				07:00
		10. Customer Service	• Identify types of customers and how to deal with them • Identify methods to get customer feedback and how to implement them • Explain various tools used to collect customer feedback • Discuss the significance of maintaining hygiene and dressing appropriately				04:00

		11. Apprenticeships and Jobs	• Practice personal grooming strategies • Illustrate the use of online platforms for job hunting • Detail the concept of Apprenticeship • Demonstrate how to enrol for Apprenticeship programs. • Draft a professional Curriculum Vitae (CV) • Role play a mock interview				02:00

Annexure II
Assessment Criteria

CRITERIA FOR ASSESSMENT OF TRAINEES

For updated Assessment criteria please refer to Qualification Pack of this Job role available at https://www.nqr.gov.in/

Assessment Criteria for CSDCI- Assistant Bar Bender and Steel Fixer	
Job Role	**Assistant Bar Bender and Steel Fixer**
Qualification Pack	**CON/Q0202**
Sector Skill Council	**Construction**

S. No.	Guidelines for Assessment
1.	Criteria for assessment for each Qualification File 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 Bodies subject to approval by SSC
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
CON/N0214: Read and understand reinforcement bar detail from hand sketches	30	70	-	-	100	15
CON/N0215: Use and maintain materials, tools and equipment relevant to reinforcement works	30	70	-	-	100	10
CON/N0216: Perform cutting and manual bending of rebar for simple shapes	30	70	-	-	100	20
CON/N0217: Assist in fabrication, placing and fixing of rebar for prefabricated and in-situ RCC structures	30	70	-	-	100	20
CON/N0101: Erect and dismantle temporary scaffold up to 3.6-meter height	30	70	-	-	100	10
CON/N8001: Work effectively in a team to deliver desired results at the workplace	30	70	-	-	100	10
CON/N9001: Work according to personal health, safety and environment protocol at construction site	30	70	-	-	100	10
DGT/VSQ/N0101: Employability Skills	20	30	-	-	50	5
Total	**210**	**490**	**-**	**-**	**750**	**100**

Annexure-III

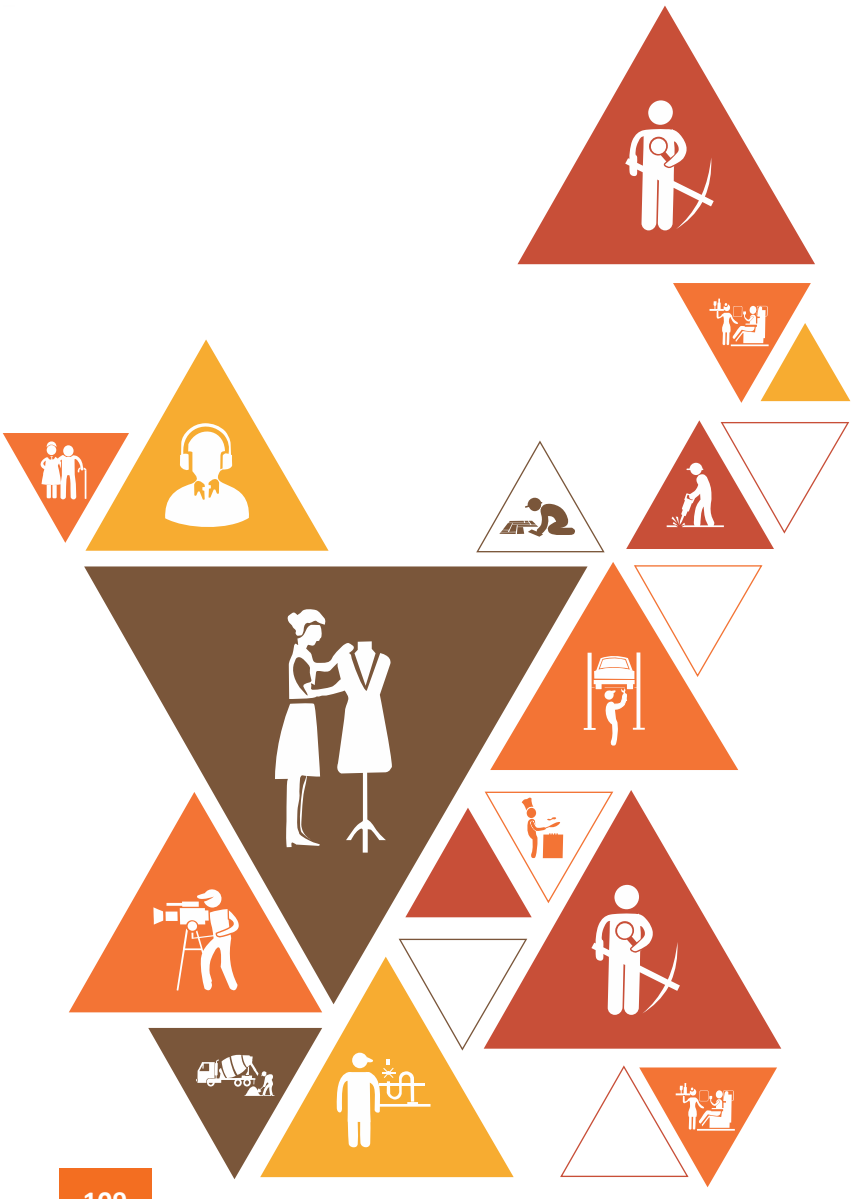
Annexure of QR Codes for Assistant Bar Bender and Steel Fixer

Chapter Name	Unit Name	Topic Name	URL	QR Code
Chapter 1: Introduction to Bar Bending and Steel Fixing Occupation	Unit 1.1: Introduction to Bar Bending and Steel Fixing	Construction Industry	https://youtu.be/nndLyZrGfWc	Construction Industry
		Types of Construction	https://youtu.be/1WVzo2UFyo8	Types of Construction
	Unit 1.2: Role and Responsibilities of an Assistant Bar Bender and Steel Fixer	Assistant Bar Bender and Steel Fixer	https://youtu.be/H1qFaFQPZ-0	Assistant Bar Bender and Steel Fixer
Chapter 2: Interpret Reinforcement Bar Detail from Hand Sketches	Unit 2.1: Interpret Reinforcement Hand Sketches	Reinforcement bar	https://youtu.be/Zecb8Wj5QHE	Reinforcement bar
		Rebar Grades	https://youtu.be/debu3vUkF8E	Rebar Grades
		Rebar Sizes	https://youtu.be/H1j_Fb3OAJc	Rebar Sizes

Chapter Name	Unit Name	Topic Name	URL	QR Code
		Rebar Sketch	https://youtu.be/4Ep9DU-g1zk	Rebar Sketch
		Symbols in Rebar Sketch		Symbols in Rebar Sketch
		Bar Bending Schedule	https://youtu.be/nGoTdkCxsuk	Bar Bending Schedule
Chapter 3: Tools and Equipment relevant to Reinforcement Works	Unit 3.1: Reinforcement Tools and Equipment	Rebar Installation	https://youtu.be/-Tp2mY4Gj0c	Rebar Installation
		Cutting Rebar	https://youtu.be/WnoqEfio9G8	Cutting Rebar
		Bending Rebar	https://youtu.be/4c43B9S3CPo	Bending Rebar
		Lifting Gears and Equipment	https://youtu.be/H2J9uuLy1hg	Lifting Gears and Equipment

Chapter Name	Unit Name	Topic Name	URL	QR Code
Chapter 4 : Cutting and Bending of Rebar for Simple Shapesp	Unit 4.1: Cutting and Bending of Rebar	Cutting and Bending of Rebar	https://youtu.be/F1iVGU_1qD8	Cutting and Bending of Rebar
		Rebar	https://youtu.be/FTRENf1ptk0	Rebar
Chapter 5: Fabrication, Placing and Fixing of Rebar	Unit 5.1: Fabrication, Placing and Fixing of Rebar	Pre-fabricated Cages	https://youtu.be/yUlPEryelMA	Pre-fabricated Cage
		Fabrication, Placing and Fixing	https://youtu.be/0mNUSewKGUk	Fabrication, Placing and Fixing
		Fixing of Structural Elements	https://youtu.be/ZHVXWxEFqWI	Fixing of Structural Elements

Chapter Name	Unit Name	Topic Name	URL	QR Code
Chapter 6: Erect and Dismantle Temporary Scaffold	Unit 6.1: Erect and dismantle a scaffold	Scaffolding	https://youtu.be/96shGh3rfXw	Scaffolding
		Uses of Scaffold	https://youtu.be/5Vj-MosphpY	Uses of Scaffold
		Scaffolding Erection and Dismantle	https://youtu.be/OKawvyUhUkA	Scaffolding Erection and Dismantle
		Safety Checks	https://youtu.be/AoDWOZE8Wb4	Safety Checks



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