Skill India
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सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

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Construction Skill Development Council

Facilitator Guide



Sector
Construction

Sub-Sector
Real Estate and Infrastructure Construction

Occupation
Bar Bending & Fixing

Bar Bender and Steel Fixer

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NSQF Level 4

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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 the successful rollout of the skill development initiatives, helping greatly our stakeholders particularly trainees, trainers and assessors etc. We are thankful to our Subject Matter Expert for the content and for 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 future.

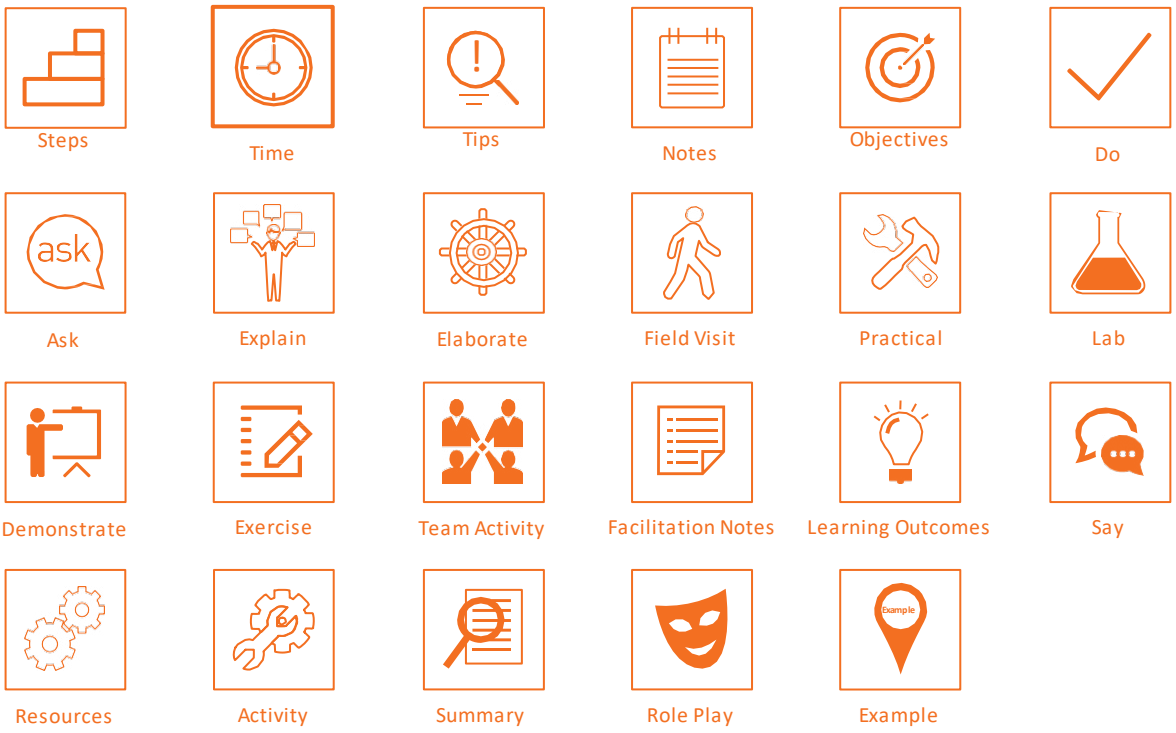
About this book

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

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

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

Symbols Used



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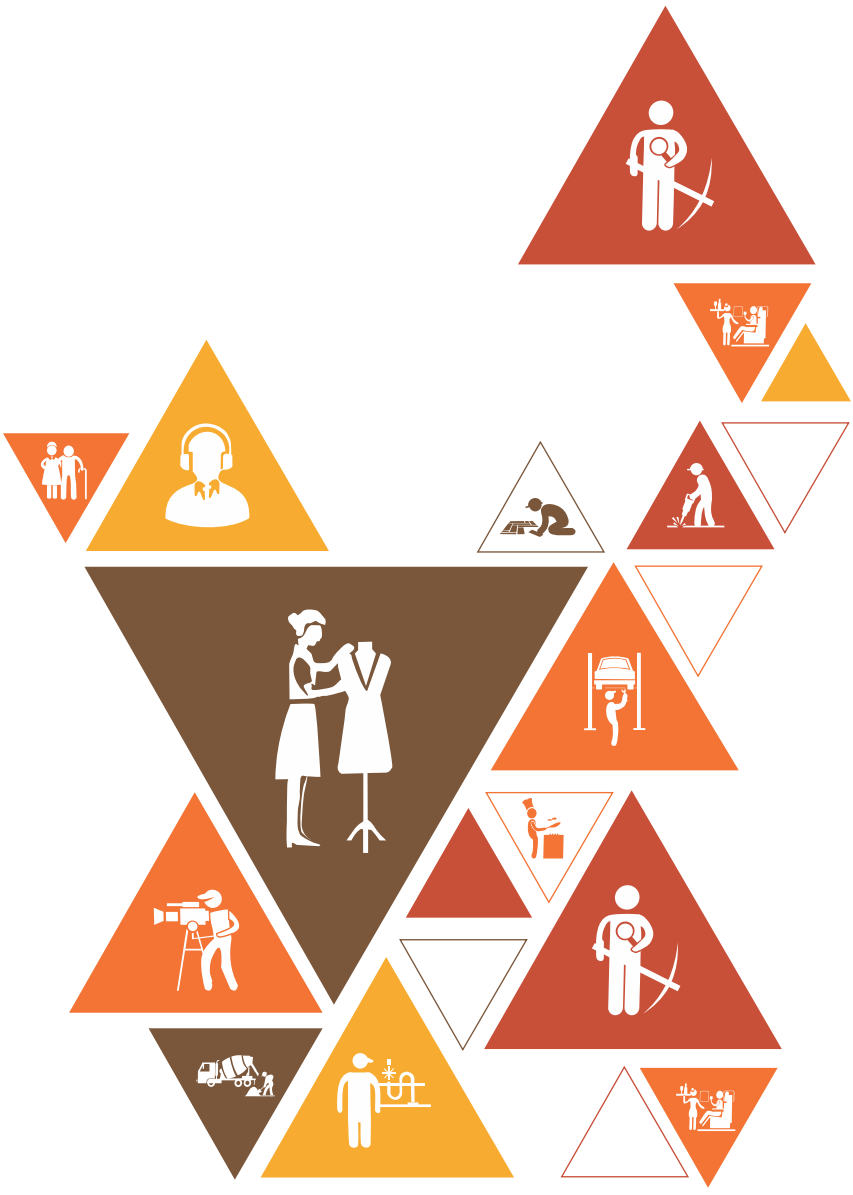
https://www.skillindiadigital.gov.in/content/list



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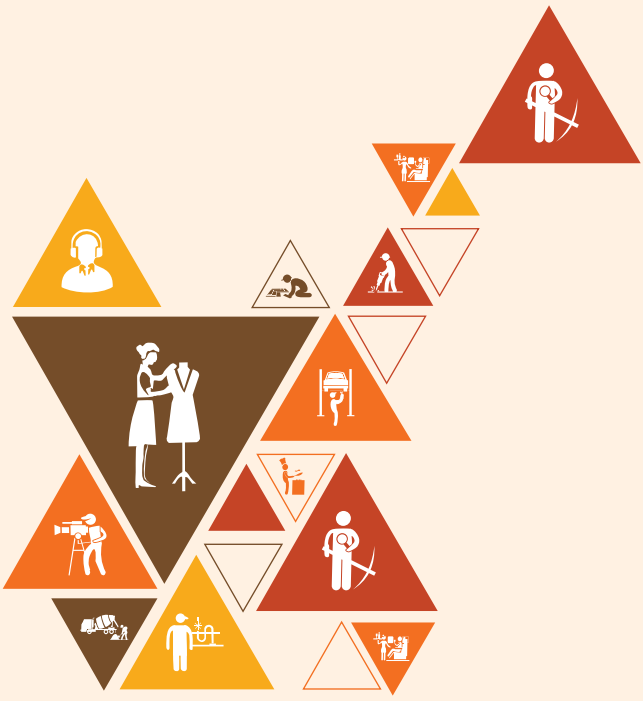
1. Introduction of Construction Sector and Job Role

Unit 1.1 – Construction Industry in India

Unit 1.2 – About Bar Bending & Steel Fixing Occupation



Bridge Module

Key Learning Outcomes

At the end of this module, trainer will ensure that participant will be able to:

1. Describe the role and responsibilities of a bar bender and steel fixer.
2. Define the personal attributes required in bar bending and steel fixing occupation.
3. Explain the future possible progression and career development options of a bar bender and steel fixer.

Unit 1.1 – Construction Industry in India

Unit Objectives:

At the end of this unit, trainer will ensure that participant will be able to:

- Describe the size and scope of the construction industry and its sub-sectors
- Compare urban and rural construction
- Observe and outline modernization of construction
- Know about major occupations in the construction sector

Resources to be Used

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

Say

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

Team Activity

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

Explain

Introduction to Major Occupations in Construction Sector:

- Explain about construction sector in India
- Compare urban and rural construction types
- Observe and outline modernization of construction
- Know about major occupations in the construction sector

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 1.1 to explain Construction Industry.
- The construction industry in India is a critical driver of economic growth, encompassing various sectors such as real estate, infrastructure, and rural construction. Let's take a closer look at each of these seg-

ments:

- Real Estate Sector: The real estate sector in India includes the development of residential, commercial, and industrial properties. It has a substantial impact on urbanization and provides essential spaces for living, working, and recreation. Key Points are:
  - Residential Properties: The demand for housing, especially in urban areas, remains high due to rapid urbanization and population growth.
  - Commercial Properties: The growth of industries and businesses fuels demand for office spaces, retail outlets, and commercial complexes.
  - Industrial Properties: As manufacturing and industrial sectors expand, there's a need for well-designed industrial facilities and warehouses.
- Infrastructure Development: India's focus on infrastructure development is crucial for economic progress and improving the quality of life for its citizens. Key Points are:
  - Transportation: Roadways, highways, railways, airports, and ports are being developed to improve connectivity.
  - Energy: Investment in power plants and renewable energy projects is essential for meeting the energy needs of a growing economy.
  - Urban Development: The "Smart Cities Mission" aims to create sustainable and efficient urban centers.
- Rural construction focuses on developing infrastructure and facilities in rural areas to bridge the urban-rural divide and improve the living standards of rural communities. Key Points are:
  - Housing: Initiatives like "Pradhan Mantri Awas Yojana - Rural" aim to provide affordable housing to rural populations.
  - Rural Infrastructure: Building roads, schools, healthcare facilities, and water supply systems enhances rural living conditions.

- The construction sector encompasses a wide range of job opportunities across various occupations. Here are some major occupations in the construction industry along with a few job roles under each occupation:
- Civil Engineers: Civil engineers play a key role in designing, planning, and overseeing construction projects. They ensure projects are completed safely, efficiently, and according to specifications.
  - Structural Engineer: Designs and analyzes the structural components of buildings and infrastructure projects.
  - Geotechnical Engineer: Evaluates soil conditions and provides recommendations for foundation design.
  - Transportation Engineer: Designs roads, highways, and transportation systems to ensure smooth mobility.
- Architects: Architects are responsible for designing the overall layout, aesthetics, and functionality of buildings and structures.
  - Residential Architect: Designs homes and residential buildings, focusing on functionality and aesthetics.
  - Commercial Architect: Specializes in designing commercial spaces, offices, and retail complexes.
  - Landscape Architect: Plans outdoor spaces, parks, and landscapes within construction projects.
- Construction Managers: Construction managers oversee the entire construction process, including budgeting, scheduling, and coordinating various teams.
  - Project Manager: Manages all aspects of a construction project, from planning to completion.
  - Site Manager: Supervises on-site activities, ensuring safety and efficient progress.
  - Estimator: Calculates project costs and prepares budgets for construction projects.
- Electricians: Electricians are responsible for installing and maintaining electrical systems in buildings and structures.

- Residential Electrician: Installs electrical systems in homes and residential complexes.
- Commercial Electrician: Works on electrical installations in commercial buildings and offices.
- Industrial Electrician: Focuses on electrical systems in factories and industrial facilities.

- Plumbers: Plumbers install, repair, and maintain water supply and drainage systems in buildings.
  - Residential Plumber: Handles plumbing systems in homes and residential buildings.
  - Commercial Plumber: Works on plumbing installations in commercial spaces and offices.
  - Pipefitter: Installs and maintains pipes in industrial settings.
- Welders and Fabricators: Welders and fabricators join and shape metal parts to create structures and components.
  - Structural Welder: Welds and assembles metal parts for construction projects.
  - Pipe Welder: Specializes in welding pipes for plumbing and industrial systems.
  - Sheet Metal Fabricator: Crafts metal components used in construction projects.
- Surveyors: Surveyors measure and map out the land, providing crucial data for construction projects.
  - Land Surveyor: Measures and defines property boundaries and topography.
  - Quantity Surveyor: Estimates materials and costs for construction projects.
  - Geodetic Surveyor: Uses advanced techniques to map larger areas and create accurate models.
- Construction Laborers: Construction laborers perform various physical tasks on construction sites to support other professionals.
  - Concrete Worker: Pours, levels, and finishes concrete for foundations and structures.
  - Carpenter: Constructs and installs wooden components in buildings.
  - Mason: Lays bricks, stones, and other masonry materials to build structures.
- Each of these major occupations within the construction sector offers a wide range of job opportunities and career paths. From engineering and design to hands-on labor, the construction industry provides diverse roles that contribute to building the world around us.

Say

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

Team Activity

- **Purpose:** The objective of this activity is to introduce participants to the different market segments within the construction industry.
- **Resources Required:** Presentation materials (slides or handouts) explaining market segments in the construction industry, internet access or library resources for research, whiteboard or flip chart with markers, printed construction industry reports or data (optional but helpful), worksheets for students to complete during the activity.
- **Tentative Duration:** 60-90 minutes
- **Methods/Procedure:**
  - **Step 1: Introduction-** Begin the activity by discussing the importance of understanding market segments in the construction industry. Explain that market segmentation helps professionals identify specialized opportunities and areas of expertise within the broader field of construction.
  - **Step 2: Presentation-** Deliver a presentation on the different market segments within the construction industry. Include information on residential construction, commercial construction,

industrial construction, infrastructure development, and specializations like green building, renovation, and restoration. Use visual aids to make the information more engaging and accessible.

- **Step 3: Group Research-** Divide the students into small groups and assign each group a specific market segment to focus on. Provide the groups with access to the internet or library resources to conduct research on their assigned market segment. They should explore the scope, current trends, major players, challenges, and potential career opportunities within their segment.
- **Step 4: Group Presentation-** Each group presents their findings to the rest of the class. Encourage them to use visuals, statistics, and examples to support their presentation. Allow for a short Q&A session after each presentation to clarify doubts and exchange insights.
- **Step 5: Reflection and Discussion-** Lead a class discussion to debrief the activity. Encourage students to share their thoughts on which market segments they find most appealing and why. Discuss the skills and qualifications required for different market segments and how students can prepare to excel in their chosen area.

- **Expected Outcome:** By the end of this classroom activity, students are expected to:
  - Understand the concept of market segmentation in the construction industry.
  - Identify the various market segments within the construction field, including residential, commercial, industrial, infrastructure, and specialized sectors.
  - Analyse the characteristics, opportunities, and challenges associated with each market segment.
  - Gain insights into potential career paths and specialization options within the construction industry.
  - Reflect on their interests and skills to make informed decisions about their vocational course and future career goals in construction.

Notes

Unit 1.2 – About Bar Bending & Steel Fixing Occupation

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Describe the role and responsibilities of a bar bender and steel fixer.
- Define the personal attributes required in bar bending and steel fixing occupation.
- Explain the future possible progression and career development options of a bar bender and steel fixer.

Resources to be Used

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

Explain

- Explain the role and responsibilities of a bar bender and steel fixer.
- Reiterate the personal attributes required in bar bending and steel fixing occupation.
- Explain the future possible progression and career development options of a bar bender and steel fixer.

Career Progression Path

- Show and explain the various stages of career progression path.
- List down the important mile stones in the progression path.
- Discuss the advantages of the career progression path.

Elaborate

- About the necessity of defining roles and responsibilities.
- List the roles and responsibilities of a Bar Bender and Steel Fixer in detail.
- Correlate the roles and responsibilities of a Bar Bender and Steel Fixer.
- About the necessity of personal attributes.
- List the personal attributes of a Bar Bender and Steel Fixer in detail.
- Correlate the roles, responsibilities and personal attributes of a Bar Bender and Steel Fixer.
- Show and explain the various stages of career progression path.
- Discuss the advantages of the career progression path.

Notes for Facilitation

- Use the Bar Bender & Steel Fixer PHB and refer unit 1.2 to explain about Masonry and Bar bending & steel fixing related Occupation.
- The role of bar bender and steel fixer is further detailed as:
    - A bar bender & fixer should be able to identify types of bars, read drawings & prepare schedule, fabricate using hand and power tools, store, transport and fix reinforcement in position in formwork in readiness for concrete pears.

- He has to deal with his assistants; his colleagues and tradesmen with related skills and has to co-ordinate with the activities of the other tradesmen also.
- He should have proficiency in use of different tools, knowledge of commonly used construction material, ability to identify quality of rebars.

- Here are the typical roles and responsibilities of a Bar Bender & Steel Fixer:
  - Material Preparation and Inspection:
    - Oversee the inspection of reinforcing bars (rebar) for defects and compliance with specifications.
    - Ensure the availability and proper storage of rebar materials at the construction site.
  - Equipment Setup and Maintenance:
    - Supervise the setup of bending machines and other tools required for rebar bending.
    - Ensure the maintenance and calibration of bending machines for accurate bending.
  - Rebar Bending and Shaping:
    - Perform precise bending and shaping of rebar according to engineering drawings and project requirements.
    - Oversee the team's work in bending rebar to the required shapes and dimensions.
  - Steel Fixing and Placement:
    - Supervise the placement and fixing of rebar in concrete forms, ensuring correct positioning and alignment.
    - Verify that steel fixing is done in compliance with structural plans and specifications.
  - Quality Control:
    - Conduct quality checks to ensure that rebar is installed correctly and meets project standards.
    - Rectify any discrepancies or errors in rebar placement as needed.
  - Safety Compliance:
    - Enforce strict adherence to safety protocols among the team members.
    - Ensure that all personnel involved in steel fixing use appropriate personal protective equipment (PPE).
  - Coordination and Communication:
    - Collaborate with project managers, engineers, and other team members to plan and execute steel fixing activities efficiently.
    - Communicate any challenges or deviations from project plans to the relevant stakeholders.
  - Team Leadership:
    - Provide guidance and supervision to Bar Benders & Steel Fixers and other team members.
    - Foster teamwork and a positive work environment within the team.
  - Material Inventory and Reporting:
    - Maintain records of rebar usage and inventory levels.
    - Prepare reports on steel fixing progress, challenges, and material requirements.
  - Repairs and Modifications:
    - Address any issues related to rebar, such as repairing damaged bars or making modifications to existing structures.
  - Continuous Learning and Skill Development:
    - Stay updated on industry best practices, codes, and regulations related to rebar bending

and steel fixing.

- Provide training and mentorship to junior team members for skill development.

- Project Documentation:
  - Assist in documenting steel fixing activities for project records and as-built drawings.
- Time Management:
  - Ensure that steel fixing tasks are completed within project timelines and deadlines.
- Problem Solving:
  - Resolve technical and logistical challenges related to rebar bending and steel fixing efficiently.
- Conflict Resolution:
  - Mediate any conflicts or issues within the team and escalate to higher authorities when necessary.
- Cost Control:
  - Optimize rebar usage and minimize material wastage to control project costs.

- Bar Bender & Steel Fixers are essential to the construction industry because they are responsible for the backbone of concrete structures. Their work directly impacts the safety, durability, and quality of buildings and infrastructure, making them indispensable professionals in the field of construction.

Say

Let us now perform an activity based on various career opportunities available for a Bar Bender and Steel Fixer.

Activity

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

Expected outcome: Participants gain awareness of the wide range of employment opportunities in the construction industry, understand the specific roles and responsibilities of a Bar Bender and Steel Fixer, and will be inspired to explore potential career paths within the field.

Exercise:

Key Solutions to PHB Exercise:

A. Short Answers:

1) The significance of the construction industry in India's economy is immense. It contributes significantly to GDP, provides employment, and drives economic growth through infrastructure development and real estate.
2) Key sectors within the Indian construction industry include real estate, infrastructure (roads, bridges, railways), commercial construction, residential construction, and industrial construction.
3) The construction industry in India is a major generator of employment, offering jobs to a diverse range of skilled and unskilled laborers, engineers, architects, and various professionals.
4) The role of a bar bender & steel fixer contributes to the construction process by ensuring the proper bending, shaping, and placement of reinforcing bars (rebar) within concrete structures, thereby strengthening and reinforcing them.
5) Safety considerations specific to bar bending & steel fixing work include wearing personal protective equipment (PPE) like helmets and gloves, ensuring correct bending techniques to avoid strain, and following safety protocols to prevent accidents during handling of heavy rebar.

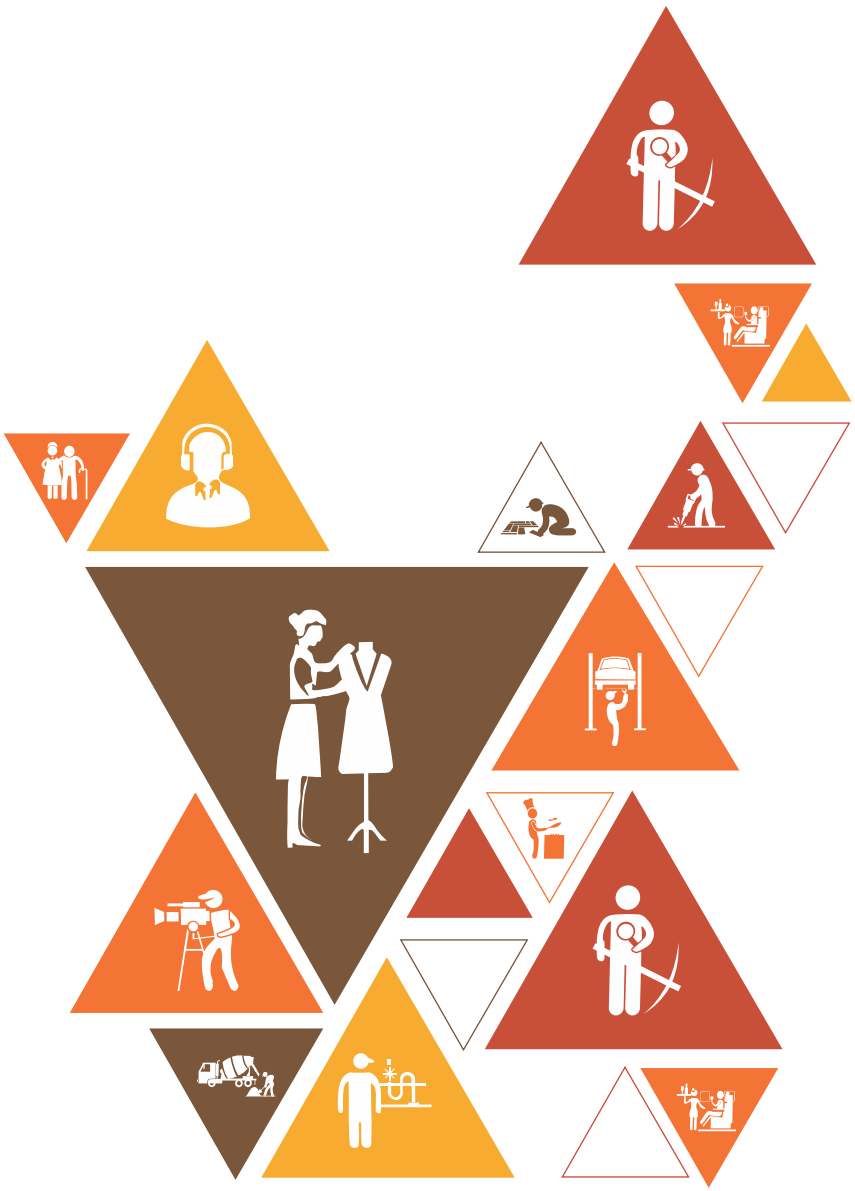
B. Fill-in-the-Blanks Questions:

1) The construction industry encompasses sectors like real estate and infrastructure.
2) Skilled labor shortage and bureaucracy are challenges in the Indian construction industry.
3) Bar benders & steel fixers work with reinforcement bars to create structural support.
4) Proper placement of reinforcement bars is crucial for maintaining structural integrity.
5) Safety equipment like helmets and gloves protect bar benders & steel fixers from hazards.

C. True/False Questions:

1) False - The construction industry has a significant impact on India's economy.
2) False - Infrastructure development is indeed a part of the construction industry in India.
3) False - Skilled labor shortage is a significant challenge faced by the Indian construction industry.
4) False - The construction industry's growth is closely related to economic factors.
5) False - Sustainability practices have a growing role in the Indian construction industry.

Notes



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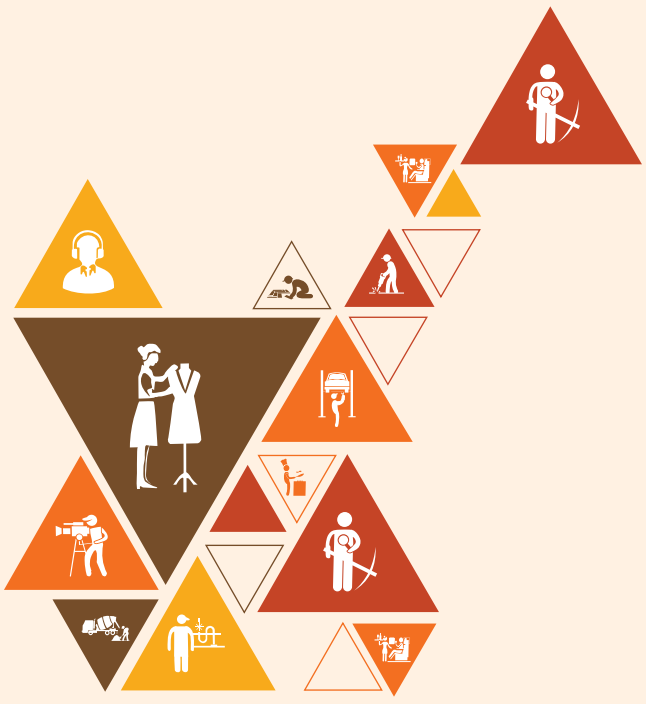
2. Generic Mathematical Skills

UNIT 2.1: Unit Conversion and Measurement

UNIT 2.2: Basic Geometrical Shapes and its Properties

UNIT 2.3: Pythagoras Theorem and its Application

UNIT 2.4: Basic Trigonometry



Bridge Module

Key Learning Outcomes

At the end of this module, trainer will ensure that participant will be able to:

1. Explain brief on metric system of measurement;
2. Explain briefly inch system of measurement;
3. Perform basic arithmetic calculations;
4. Know about basic geometrical shapes;
5. Calculate area, volume and perimeter of different shapes;
6. Know about Pythagoras theorem;
7. Perform basic calculations using Pythagoras theorem.
8. Calculate problems using trigonometric functions.

UNIT 2.1: Unit Conversion and Measurement

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Explain brief on metric system of measurement; and
- Understanding inch system of measurement.

Resources to be Used

- Theory
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- Practical
  - Calculator, conversion charts, measurement tapes

Do

- Perform basic mathematical calculation
- Identify the different types of shapes

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 2.1 to explain Unit Conversion and Measurement.
- Bar Benders and Steel Fixers need foundational mathematical skills to accurately measure, calculate dimensions, and estimate material quantities. They perform calculations for lengths, angles, and quantities of steel reinforcement components.
- Bar Benders & Steel Fixers often need to calculate measurements, dimensions, and quantities of reinforcing bars (rebar) accurately. These calculations are crucial for determining the required length, angles, and shapes of rebar needed for specific structural elements.
- Some of the key mathematical tasks they perform include:
  - Length Calculations: Bar Benders calculate the required length of rebar based on architectural and engineering drawings. This ensures that rebar pieces fit precisely within the construction framework.
  - Bending Angle and Radius: To bend rebar to the correct angle and radius, Bar Benders use mathematical calculations to determine the degree of bend and the curvature needed.
  - Quantity Estimation: They calculate the quantities of rebar required for a project, accounting for variations in structural elements like beams, columns, and slabs.
  - Spacing and Placement: Calculations are made to determine the correct spacing between rebar bars and their placement within concrete forms. This ensures structural strength and integrity.
  - Weight and Load-Bearing Capacity: By calculating the weight and load-bearing capacity of rebar configurations, they ensure that the structural elements can support the required loads.
  - Material Inventory: Keeping track of the inventory of rebar materials involves mathematical calculations to manage stock levels efficiently.
- The construction industry involves working with various shapes and configurations of reinforcing bars (rebar) to create structurally sound concrete elements. Identifying and working with these various rebar shapes is essential for Bar Benders & Steel Fixers to ensure that concrete structures have the necessary

strength and durability to meet safety and structural integrity standards in construction projects.

Activity 2.1.1

Name: "Measuring and Converting with Metric and Inch Systems"

Purpose: The purpose of this activity is to familiarize bar benders and steel fixers with both the metric and inch systems of measurement, as these systems are commonly used in construction projects worldwide. This knowledge will enable them to work with various measurement units effectively.

Resources Required:

- Metric tape measures or rulers
- Inch tape measures or rulers
- A variety of construction materials (rebar, beams, etc.)
- Whiteboard or flip chart
- Markers

Tentative Duration: 45-60 minutes

Procedure:

1. Introduction (5 minutes):
    - Begin by explaining the importance of accurate measurements in construction.
    - Mention that two main measurement systems, the metric system and the inch system, are used in construction.
2. Metric System Overview (10 minutes):
    - Discuss the metric system's key features:
        i. Base 10 system
        ii. Standard units like meters, centimeters, and millimeters
        iii. Use of metric tape measures or rulers for measurement
    - Show examples of metric measurements on the whiteboard.
3. Inch System Overview (10 minutes):
    - Discuss the inch system's key features:
        i. Commonly used in the United States and some other countries
        ii. Units like inches and feet, often with fractional representation
        iii. Use of inch tape measures or rulers for measurement
    - Show examples of inch measurements on the whiteboard.
4. Hands-On Activity (15 minutes):
    - Divide the learners into pairs or small groups.
    - Provide each group with a variety of construction materials (e.g., rebar, beams, wooden boards).
    - Instruct them to measure the length, width, and height of these materials using both metric and inch tape measures or rulers.
    - Have each group record their measurements on the whiteboard.
5. Conversion Challenge (10 minutes):
    - Ask the groups to choose one measurement (e.g., length) and convert it from metric to inch or vice versa.
    - Discuss the conversion process and any challenges faced.

- Explain the importance of accurately converting measurements when working on construction projects that use different systems.

6. Group Discussion (5 minutes):
    - Engage in a group discussion where participants share their experiences and insights regarding the differences between the metric and inch systems.
    - Encourage them to discuss scenarios where they might encounter both systems in their work.

Expected Outcome:

- Bar benders and steel fixers will have a practical understanding of the metric and inch systems of measurement.
- They will be able to measure construction materials accurately in both systems.
- Learners will gain experience in converting measurements between the two systems, enhancing their versatility in construction projects that use different measurement units.

Notes

UNIT 2.2: Basic Geometrical Shapes and its Properties

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Perform basic arithmetic calculations;
- Know about basic geometrical shapes; and
- Calculate area, volume and perimeter of different shapes.

Resources to be Used

- Theory
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- Practical
  - Calculator, conversion charts, measurement tapes

Do

- Explain basic arithmetic calculations;
- Demonstrate basic geometrical shapes; and explain them
- Calculate area, volume and perimeter of different shapes.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 2.2 to explain Basic Geometrical Shapes and its Properties.
- Bar Benders & Steel Fixers often perform basic arithmetic calculations to determine the quantities of materials required for reinforcing concrete structures. They add, subtract, multiply, and divide measurements to ensure they have the right amount of reinforcing bars (rebar) and other materials for construction projects. These calculations are crucial for project cost estimation and resource management.
- Bar Benders & Steel Fixers must be familiar with basic geometrical shapes like squares, rectangles, triangles, and circles. This knowledge helps them interpret blueprints and construction plans accurately, ensuring that they bend, shape, and fix reinforcing bars (rebar) in the correct configurations. A solid grasp of geometry is vital for maintaining structural integrity and adherence to design specifications.
- Bar Benders & Steel Fixers frequently calculate the area of concrete slabs, the volume of concrete pours, and the perimeter of structural elements like columns and beams. These calculations assist in determining the quantity of rebar and concrete needed, ensuring accurate placement and reinforcing. Accurate area, volume, and perimeter calculations are essential for cost-effective and structurally sound construction projects.

Activity - 1

Mathematical skills - Practice

Conduct a group activity.

- Ask the participants to assemble at a designated place.

- Distribute the 'Practical Activity Format' which includes task, duration allowed, specific instructions, method statements, etc.
- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.
- Maximum duration mentioned in the below table is for extensive practice and corresponding guidance until the skill is acquired by the participants.
- Explain the roles to each of them.
- Rotate the roles after completing one cycle.

Sub activity	Skill Practice	Time	Resources
1	Measure the size of the classroom in metric system by using a tape measure	2 Hours	Tape measure, stationary items (pen, marker, scale and notebook)
2	Measure the size of the classroom in imperial system by using a tape measure	2 Hours	
3	Convert the following: • 100000 mm into ..... mts, and • 1000mts into ..... mm. • 100 inches into ..... ft. • 10000 sft into ..... m^2 • $1m^3$ into ..... mm^3	1 Hour	
4	Solve the below: 300-200+100x50-30/5 = ... 100-20/3+15-150 = ... 1.5-0.2/4+2.8-1500+15000 = ...	1 Hour	

Table 2.2.1 – Mathematical skills

Specific Instructions:

- Make sure all the participants are wearing proper PPEs.
- Explain the overall procedure and key points of measuring the classroom with a tape measure before commencing the exercise.
- Use the unit conversion table for the activity.
- Give hints on the method of converting the units easily.
- Assist them wherever, it is necessary during the activity.
- At end of the process ask each one of them to mention the experience they had in activity.
- Clarify doubts, if any.
- Check and observe that all the steps followed by the participants.
- Complete the activity in scheduled time, at the end of activity, to assess the skill and knowledge acquired, call a person randomly from the group and ask him to explain the steps involved for mathematical conversion of units, calculation of area/volume and squaring of corners.

UNIT 2.3: Pythagoras Theorem and its Application

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Know about Pythagoras theorem; and
- Perform basic calculations using Pythagoras theorem.

Resources to be Used

- Theory
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- Practical
  - Calculator, conversion charts, measurement tapes

Do

- Explain Pythagoras theorem; and
- Show the basic calculations using Pythagoras theorem.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 2.3 to explain Pythagoras Theorem and its Application.
- In the context of Bar Bending & Steel Fixing, understanding Pythagoras' theorem is essential for ensuring the correct alignment and positioning of structural elements. Pythagoras' theorem states that in a right-angled triangle, the square of the length of the hypotenuse (the side opposite the right angle) is equal to the sum of the squares of the other two sides. This theorem can be applied in various construction scenarios, such as:
  - **Square and Rectangular Structures:** When constructing square or rectangular foundations, beams, or columns, Bar Benders & Steel Fixers can use Pythagoras' theorem to ensure that the corners are perfectly right-angled. This is crucial for maintaining structural integrity.
  - **Diagonal Measurements:** Pythagoras' theorem helps in measuring diagonals accurately. For example, when checking the diagonal measurements of a square slab or a rectangular structure, it ensures that the diagonals are equal, signifying proper alignment.
  - **Brace and Support Systems:** In the installation of brace and support systems, Pythagoras' theorem aids in verifying the diagonal bracing's length and positioning, ensuring stability and load-bearing capacity.
- Bar Benders & Steel Fixers can apply Pythagoras' theorem to calculate distances, angles, and diagonals in construction projects. Here's how they can perform basic calculations using the theorem:
  - **Calculating Diagonal Length:** When working on structures with rectangular or square foundations, Bar Benders & Steel Fixers can use Pythagoras' theorem to calculate the length of the diagonal. Given the lengths of the two adjacent sides (a and b), they can find the diagonal length (c) using the formula: $c^2 = a^2 + b^2$. This helps in ensuring the structure's right angles and proper alignment.
  - **Measuring Elevations and Slopes:** Pythagoras' theorem can be employed to calculate the height or slope of structural elements. For instance, when determining the height of a sloped beam or

roof truss, the horizontal and vertical distances can be used to apply the theorem and find the length of the diagonal (the slope or height).

- **Checking Structural Alignment:** In steel fixing and bar bending, ensuring that structural components are properly aligned and perpendicular is critical. Bar Benders & Steel Fixers can use Pythagoras' theorem to double-check the alignment and make adjustments if necessary.

Activity 2.3.1

Name: "Pythagoras' Theorem in Structural Alignment"

Purpose: The purpose of this activity is to help bar benders and steel fixers understand Pythagoras' theorem and its practical application in ensuring accurate structural alignment in construction.

Resources Required:

- Blueprints or construction drawings with right-angled triangles or structures.
- Tape measures or rulers.
- Calculator.
- Pencils and paper for calculations.

Tentative Duration: 45-60 minutes

Procedure:

1) **Introduction (5 minutes):**
   - Begin by explaining the importance of Pythagoras' theorem in construction, particularly in ensuring structural alignment and right angles.
   - Emphasize that this mathematical principle is a valuable tool in their work.
2) **Theory Review (10 minutes):**
   - Provide a brief overview of Pythagoras' theorem: "In a right-angled triangle, the square of the hypotenuse (the side opposite the right angle) is equal to the sum of the squares of the other two sides."
   - Use diagrams to illustrate the theorem.
3) **Blueprint Analysis (10 minutes):**
   - Distribute blueprints or construction drawings that include right-angled triangles or structures with right angles.
   - Ask the learners to identify and highlight the right-angled triangles on the blueprints.
4) **Measurement and Calculation (15 minutes):**
   - Instruct the learners to choose a right-angled triangle from the blueprints and measure the lengths of its two shorter sides (a and b).
   - Have them calculate the length of the hypotenuse (c) using Pythagoras' theorem: $c^2 = a^2 + b^2$.
   - Encourage them to use calculators to perform the calculations accurately.
5) **Alignment Verification (10 minutes):**
   - Ask the learners to visit a construction site (if possible) or bring a real structural element (e.g., a beam or column) into the training area.
   - Using the measurements and calculations they just made, have them check the structural alignment or right angles of the chosen element.
6) **Discussion (5 minutes):**
   - Conduct a group discussion to share findings and insights.

- Discuss the importance of using Pythagoras' theorem in their work to ensure structural integrity and alignment.

Expected Outcome:

- Learners will gain a practical understanding of Pythagoras' theorem and its application in verifying structural alignment.
- They will practice measuring, calculating, and using the theorem to ensure that construction elements are correctly aligned and have right angles.
- Learners will develop confidence in applying mathematical principles to their work, enhancing the quality and accuracy of their construction projects.

Notes

UNIT 2.4: Basic Trigonometry

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Know about basic trigonometry formulas; and
- Calculate problems using trigonometric functions

Resources to be Used

- Theory
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- Practical
  - Calculator, conversion charts, measurement tapes

Do

- Explain about basic trigonometry formulas; and
- Calculate problems using trigonometric functions

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 2.4 to explain Basic Trigonometry.
- In the context of Bar Bending & Steel Fixing, understanding Pythagoras' theorem is essential for ensuring the correct alignment and positioning of structural elements. Pythagoras' theorem states that in a right-angled triangle, the square of the length of the hypotenuse (the side opposite the right angle) is equal to the sum of the squares of the other two sides. This theorem can be applied in various construction scenarios, such as:

Activity

Name: "Trigonometry in Structural Alignment"

Purpose: The purpose of this activity is to introduce bar benders and steel fixers to basic trigonometry concepts and demonstrate their practical application in ensuring precise structural alignment and angle measurements in construction.

Resources Required:

- Whiteboard or chalkboard.
- Markers or chalk.
- Tape measures or rulers.
- Calculator.
- Pencils and paper for calculations.

Tentative Duration: 60-75 minutes

Procedure:

1. **Introduction (5 minutes):**
    - Begin by explaining the importance of trigonometry in construction, particularly in measuring angles and ensuring structural alignment.
    - Emphasize that trigonometric functions are valuable tools in their work.
2. **Basic Trigonometry Overview (10 minutes):**
    - Provide a brief introduction to the three fundamental trigonometric functions: sine, cosine, and tangent.
    - Explain the relationships between these functions and the sides of a right-angled triangle (opposite, adjacent, and hypotenuse).
3. **Theory Discussion (15 minutes):**
    - Use the whiteboard or chalkboard to draw and label a right-angled triangle.
    - Explain how to use trigonometric functions to calculate angles and side lengths in such triangles.
    - Discuss the concepts of opposite, adjacent, and hypotenuse in the context of construction.
4. **Problem-Solving (20 minutes):**
    - Present the learners with real-life construction scenarios involving right-angled triangles. For example, measuring the slope of a roof or the angle of a support beam.
    - Instruct them to use trigonometric functions to calculate the required angles or side lengths.
    - Encourage them to work in pairs or small groups to solve these problems.
5. **Calculation and Presentation (10 minutes):**
    - Ask each group to present their solutions to the construction scenarios on the whiteboard or chalkboard.
    - Discuss the methods used and any challenges faced during the calculations.
6. **Discussion and Reflection (10 minutes):**
    - Conduct a group discussion to reflect on the practical applications of trigonometry in their work.
    - Emphasize the importance of accurately measuring angles and ensuring structural alignment in construction projects.

Expected Outcome:

- Learners will gain a basic understanding of trigonometry concepts and their application in construction.
- They will practice solving construction-related problems using trigonometric functions.
- Learners will develop confidence in using trigonometry to measure angles and ensure precise structural alignment, improving the quality and accuracy of their construction work.

Exercise:

Key Solutions to PHB Exercise:

Short Questions:

1) The conversion factor between meters and millimeters is 1000. This means that 1 meter is equal to 1000 millimeters.
2) The sum of the interior angles of a triangle is always 180 degrees.
3) A hexagon has 6 sides.
4) In a Pythagorean triple, the relationship between the sides is that the square of the length of the hypotenuse (the longest side) is equal to the sum of the squares of the lengths of the other two sides. In other words, for a Pythagorean triple (a, b, c), $a^2 + b^2 = c^2$.
5) The tangent of an acute angle in a right triangle is the ratio of the length of the side opposite the angle to the length of the side adjacent to the angle.

Fill-in-the-Blanks Questions:

1) 1000 millimetres are equal to 0.001 meter(s).
2) A triangle with all sides of different lengths is called a scalene triangle.
3) A circle is defined as the set of all points equidistant from a given point.
4) The Pythagorean theorem is named after the ancient Greek mathematician Pythagoras.
5) The angle of 90 degrees is called a right angle.

True/False Questions:

1) False: A Celsius temperature can be lower than a Fahrenheit temperature. There is a point where the two temperature scales intersect, and below that point, Celsius temperatures are lower than Fahrenheit temperatures.
2) True: The sum of the angles in any triangle is always 180 degrees.
3) True: The Pythagorean theorem has applications in fields like navigation, engineering, and geometry.
4) False: The tangent of a right angle (90 degrees) is undefined because the denominator becomes zero in the trigonometric tangent function.
5) True: In a right triangle, the side opposite the larger acute angle is always longer than the side opposite the smaller acute angle. This is a fundamental property of right triangles based on the Pythagorean theorem.

Notes

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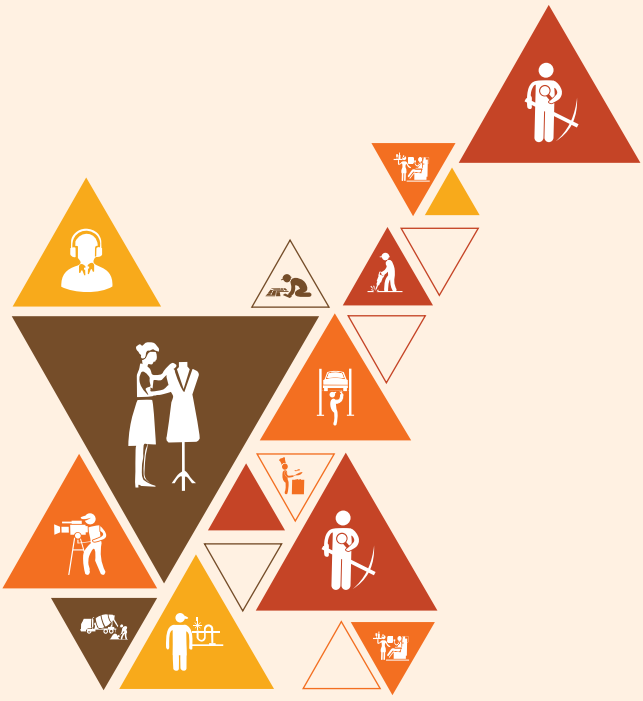
3. Read Drawings /Sketches and Bar Bending Schedule (BBS)

UNIT 3.1: Bar Bending Drawings

UNIT 3.2: Bar Bending Schedule



CON/N0204

Key Learning Outcomes

At the end of this module, trainer will ensure that participant will be able to:

- Recognize the details in a reinforcement drawing, such as type and size of reinforcement bar, cover to reinforcement, spacing, chairs requirement etc.
- Discuss different grades and diameters of reinforcement bars and binding wires used in construction work.
- Convert given units of measurement in the metric system to the imperial system and vice versa relevant to bar bending and steel fixing.
- Explain insertion and fixing sequence for different types of R.C.C structures such as slab, beam, column, footing, wall, staircase etc.
- Calculate the number of bars, chair and spacer from drawing and bar bending schedule.
- Calculate the cutting length for various shapes of reinforcement bars (L-shape, U-shape) from sketches, drawing and bar bending schedule.
- Calculate the deduction for bends.
- Calculate the cutting length for Stirrups of various shape (Square, Rectangle, Circle).
- Discuss ways to minimize wastage of reinforcement steel.
- Interpret routine drawings and sketches to confirm the details such as diameter, shape, and location of reinforcement bar, cutting length, cover to reinforcement bar, bar description, number of bars, bend of reinforcement bar, etc., within the allotted time.
- Interpret bar bending schedule to confirm details such as diameter, shape, and location of reinforcement bar, cutting length, cover to reinforcement bar, bar description, number of bars, bend of reinforcement bar, etc., within the allotted time.
- Interpret the BBS and estimate quantity of reinforcement work for relevant RCC structure within the allotted time.

UNIT 3.1: Bar Bending Drawings

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Recognize the details in a reinforcement drawing, such as type and size of reinforcement bar, cover to reinforcement, spacing, chairs requirement etc.
- Discuss different grades and diameters of reinforcement bars and binding wires used in construction work.
- Convert given units of measurement in the metric system to the imperial system and vice versa relevant to bar bending and steel fixing.
- Explain insertion and fixing sequence for different types of R.C.C structures such as slab, beam, column, footing, wall, staircase etc.
- Calculate the deduction for bends.
- Calculate the cutting length for Stirrups of various shape (Square, Rectangle, Circle).
- Discuss ways to minimize wastage of reinforcement steel.
- Interpret routine drawings and sketches to confirm the details such as diameter, shape, and location of reinforcement bar, cutting length, cover to reinforcement bar, bar description, number of bars, bend of reinforcement bar, etc., within the allotted time.

Resources to be Used

- Theory
    - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- Practical
    - Drawings of various types of structures and structural elements, Bar bending schedule sample, Model room

Do

- Explain the details in a reinforcement drawing, such as type and size of reinforcement bar, cover to reinforcement, spacing, chairs requirement etc.
- Explain different grades and diameters of reinforcement bars and binding wires used in construction work.
- Convert given units of measurement in the metric system to the imperial system and vice versa relevant to bar bending and steel fixing.
- Explain insertion and fixing sequence for different types of R.C.C structures such as slab, beam, column, footing, wall, staircase etc.
- Calculate the deduction for bends.
- Calculate the cutting length for Stirrups of various shape (Square, Rectangle, Circle).
- Explain ways to minimize wastage of reinforcement steel.
- Interpret routine drawings and sketches to confirm the details such as diameter, shape, and location of reinforcement bar, cutting length, cover to reinforcement bar, bar description, number of bars, bend of reinforcement bar, etc., within the allotted time.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 3.1 to explain Bar Bending Drawings.
- Reinforcement drawings provide essential information for bar benders and steel fixers. They specify the type and size of reinforcement bars, the cover (distance between the bar surface and the concrete surface), spacing between bars, and the requirement for chairs (supports). These details ensure that the reinforcement is placed correctly to provide structural strength and durability.
- Reinforcement bars come in various grades, with commonly used ones being Fe415, Fe500, etc. These grades indicate the tensile strength of the bars. Diameters of bars vary, such as 8mm, 10mm, 12mm, and so on. Binding wires, usually made of mild steel, secure the bars in place during construction.
- Bar benders and steel fixers often need to convert units from the metric system (e.g., meters, millimeters) to the imperial system (e.g., feet, inches) and vice versa. These conversions are crucial for precise measurements in construction work.
- Different types of reinforced concrete (R.C.C.) structures, like slabs, beams, columns, footings, walls, and staircases, require specific insertion and fixing sequences for reinforcement bars. These sequences ensure proper alignment and structural integrity.
- When bending reinforcement bars, there is a deduction in length due to the bending process. Understanding how to calculate this deduction accurately is essential to avoid wastage and ensure the bars meet the required specifications.
- Stirrups provide lateral support to vertical bars in concrete structures. The cutting length for stirrups varies based on the shape of the structure (square, rectangle, circle). Bar benders need to calculate these lengths precisely for effective reinforcement.
- Minimizing wastage is crucial to control construction costs and reduce environmental impact. Techniques to minimize wastage include optimizing cutting and bending processes, accurate measurement, and proper storage of reinforcement bars.
- Bar benders and steel fixers must interpret construction drawings and sketches swiftly and accurately. They need to confirm details such as bar diameter, shape, location, cutting length, cover, bar description, quantity, and bending requirements to execute their tasks efficiently and meet project specifications.

Activity 3.1.1

Name: "Interpreting Reinforcement Drawings"

Purpose: The purpose of this activity is to help bar benders and steel fixers develop their skills in interpreting reinforcement drawings accurately, as this is crucial for ensuring that the reinforcement work meets the required specifications.

Resources Required:

- Reinforcement drawings or sketches (preferably simple ones).
- Paper and pencils.
- Measuring tools (rulers or tape measures).

Tentative Duration: 45-60 minutes

Procedure:

1) **Introduction (5 minutes):**
    - Begin by explaining the importance of understanding reinforcement drawings in bar bending and steel fixing.
    - Emphasize that accurate interpretation ensures that the reinforcement is placed correctly in construction projects.
2) **Presentation of Drawings (10 minutes):**

- Provide the learners with a set of reinforcement drawings or sketches.
- These drawings should include details such as the type and size of reinforcement bars, cover to reinforcement, spacing, and any chair requirements.

3) **Group Activity (15 minutes):**
   - Divide the learners into small groups.
   - Assign each group a reinforcement drawing or sketch.
   - Instruct them to analyze the drawing and identify key details, including the type and size of reinforcement bars, cover, spacing, and chair requirements.
4) **Discussion (10 minutes):**
   - Have each group present their findings to the class.
   - Encourage discussions on how to accurately interpret the drawings and any challenges faced during the process.
5) **Unit Conversion Challenge (5 minutes):**
   - Provide a reinforcement drawing with measurements in either the metric system (e.g., meters, millimeters) or the imperial system (e.g., feet, inches).
   - Challenge the learners to convert the measurements to the other system within a time limit.
6) **Calculation Exercise (5 minutes):**
   - Present a reinforcement drawing that requires calculating the cutting length for stirrups of a specific shape (e.g., square or rectangular).
   - Ask the learners to calculate the cutting length based on the drawing.
7) **Wastage Reduction Strategies (5 minutes):**
   - Discuss strategies to minimize wastage of reinforcement steel based on the drawings they've analyzed.
   - Encourage ideas such as optimizing cutting patterns and minimizing excess lengths.

Expected Outcome:

- Learners will improve their skills in interpreting reinforcement drawings accurately and efficiently.
- They will gain confidence in identifying key details in drawings, including the type and size of reinforcement bars, cover, spacing, and chair requirements.
- Learners will develop the ability to perform unit conversions relevant to their work, calculate cutting lengths, and discuss strategies to reduce wastage of reinforcement steel.

Notes

UNIT 3.2: Bar Bending Schedule

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Calculate the number of bars, chair and spacer from drawing and bar bending schedule.
- Calculate the cutting length for various shapes of reinforcement bars (L-shape, U-shape) from sketches, drawing and bar bending schedule.
- Interpret bar bending schedule to confirm details such as diameter, shape, and location of reinforcement bar, cutting length, cover to reinforcement bar, bar description, number of bars, bend of reinforcement bar, etc., within the allotted time.
- Interpret the BBS and estimate quantity of reinforcement work for relevant RCC structure within the allotted time.

Resources to be Used

- Theory
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- Practical
  - Drawings of various types of structures and structural elements, Bar bending schedule sample, Model room

Do

- Calculate the number of bars, chair and spacer from drawing and bar bending schedule.
- Calculate the cutting length for various shapes of reinforcement bars (L-shape, U-shape) from sketches, drawing and bar bending schedule.
- Explain bar bending schedule to confirm details such as diameter, shape, and location of reinforcement bar, cutting length, cover to reinforcement bar, bar description, number of bars, bend of reinforcement bar, etc., within the allotted time.
- Explain the BBS and estimate quantity of reinforcement work for relevant RCC structure within the allotted time.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 3.2 to explain Bar Bending Schedule.
- In construction, it's essential to calculate the exact number of reinforcement bars, chairs (supports), and spacers needed for a project. This ensures efficient use of materials and accurate construction. To do this, refer to the reinforcement drawing and bar bending schedule. Tips: Double-check your calculations and consider ordering a slight excess of materials to account for unexpected changes or waste.
- Reinforcement bars often need to be shaped into L-shapes, U-shapes, or other configurations to fit the design of a structure. Accurate calculation of cutting lengths for these shapes is crucial for efficient bar bending and fixing. Tips: Pay attention to the dimensions of the shape and the bend angles, and ensure precise cutting to avoid wastage.
- A Bar Bending Schedule is a document that provides comprehensive information about reinforcement bars used in a construction project. It includes details such as bar diameter, shape, location, cutting length, cover, bar description, quantity, and bending requirements. Understanding and following the

BBS is critical to ensure that the construction work aligns with the design specifications. Tips: Familiarize yourself with the BBS format and use it as a reference throughout the project. Communicate any discrepancies or issues with the BBS to the relevant authorities.

- When working on an RCC (Reinforced Concrete Cement) structure, understanding the BBS is essential. It allows you to estimate the quantity of reinforcement work accurately. This estimation helps in planning material procurement, labor allocation, and project timelines. Tips: Regularly update your quantity estimates based on the progress of work and any design changes. Collaborate with engineers and project managers to ensure alignment with project goals.

Activity 3.2.1

Name: "Interpreting Bar Bending Schedule and Quantity Estimation"

Purpose: This activity aims to enhance the skills of bar benders and steel fixers in interpreting bar bending schedules (BBS) and estimating the quantity of reinforcement work accurately. These skills are vital for efficient construction and resource management

Resources Required:

- Sample bar bending schedules and reinforcement drawings.
- Paper and pencils for calculations.
- Measuring tools (rulers or tape measures).

Tentative Duration: 60-75 minutes

Procedure:

1. **Introduction (5 minutes):**
    - Start by explaining the importance of interpreting BBS and estimating quantities accurately in construction projects.
    - Emphasize how this contributes to project efficiency and resource management.
2. **Presentation of BBS (10 minutes):**
    - Provide the learners with sample bar bending schedules and related reinforcement drawings.
    - Highlight key details, such as diameter, shape, location, cutting length, cover, bar description, quantity, and bending requirements.
3. **Quantity Estimation Challenge (15 minutes):**
    - Divide the learners into small groups.
    - Assign each group a specific section of a sample RCC structure (e.g., a beam, column, or slab) along with the corresponding BBS.
    - Instruct them to estimate the quantity of reinforcement required for that section based on the BBS and drawings.
4. **Calculating Chair and Spacer Requirements (10 minutes):**
    - Provide the learners with another set of BBS and drawings, focusing on chair and spacer requirements.
    - Ask them to calculate the number of chairs and spacers needed for a given section of the structure.
5. **Group Presentations (15 minutes):**
    - Have each group present their quantity estimates and chair/spacer calculations to the class.
    - Encourage discussions on the methods used and any challenges faced during the estimation process.
6. **Q&A and Discussion (10 minutes):**

- Conduct a Q&A session to address any questions or uncertainties raised by the learners.
- Facilitate a discussion on the importance of accurate quantity estimation in construction.

Expected Outcome:

- Learners will improve their ability to interpret BBS accurately and estimate the quantity of reinforcement required for various RCC structures.
- They will gain confidence in calculating chair and spacer requirements.
- The activity will enhance their project planning and resource management skills, contributing to efficient construction practices.

Exercise:

Key Solutions to PHB Exercise:

Short Questions:

1. In a reinforcement drawing, you can find details such as the type and size of reinforcement bars, cover to reinforcement, spacing between bars, and any requirements for chairs and spacers.
2. The grade of reinforcement bars typically used for high-strength applications in construction is Fe500, indicating a higher tensile strength.
3. The recommended insertion and fixing sequence for reinforcement in a concrete slab often involves placing the bottom layer of bars first, adding spacers, and then placing the top layer of bars.
4. Two ways to minimize the wastage of reinforcement steel in construction include optimizing cutting patterns to reduce leftover bar lengths and ensuring accurate measurements to minimize errors.
5. To estimate the quantity of reinforcement work for a specific RCC (Reinforced Concrete Cement) structure within the allotted time, you can refer to the Bar Bending Schedule (BBS) and reinforcement drawings, calculate the required quantities based on design specifications, and update your estimates as the project progresses.

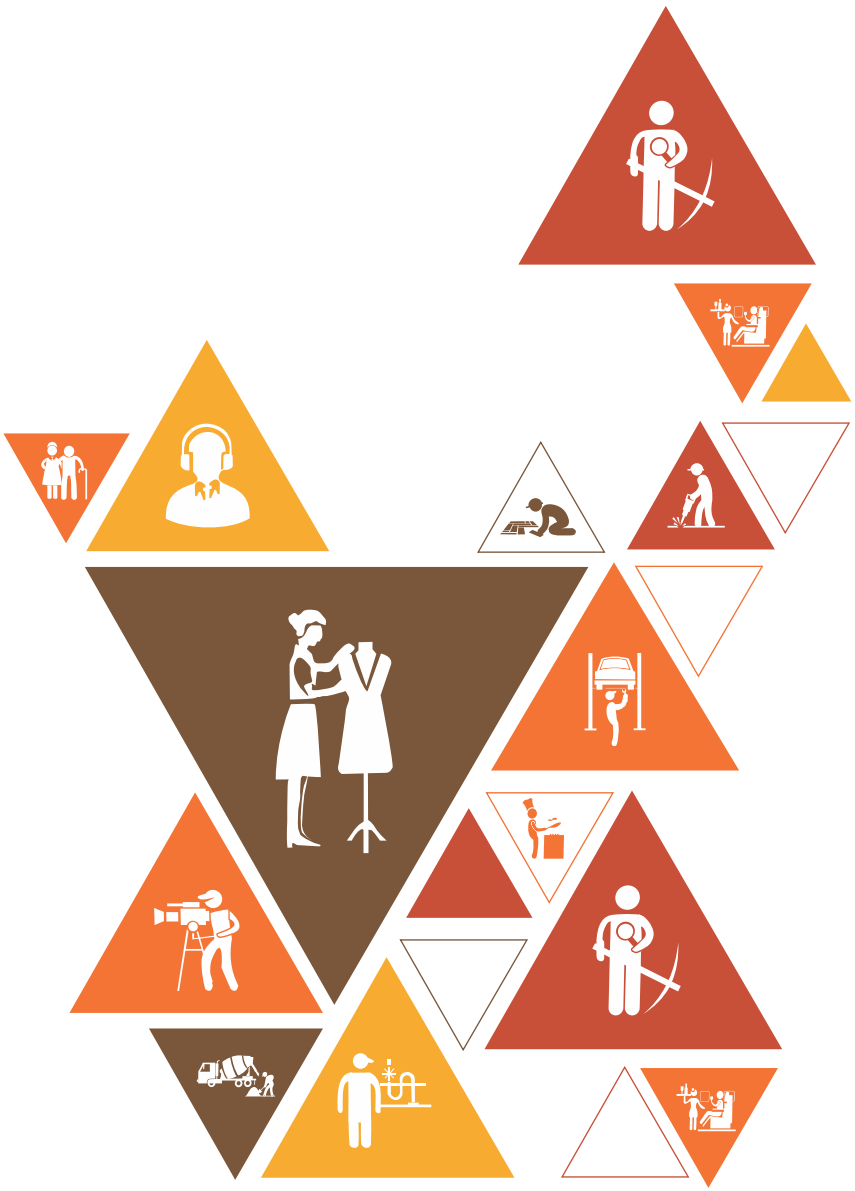
Fill-in-the-Blanks:

1) Chairs are used in construction to support and maintain the correct positioning of a) Rebar.
2) Binding wires are commonly used in construction to securely b) Tie reinforcement bars.
3) Convert 150 millimeters to inches: a) 5.91 inches.
4) To convert meters to feet, multiply by a) 3.28.
5) The BBS (Bar Bending Schedule) provides information about reinforcement details within a construction project, including the diameter, shape, and a) Location of reinforcement bars.

True/False Questions:

1. True: The spacing between reinforcement bars is specified in a reinforcement drawing.
2. True: Reinforcement bars come in various diameters, and the choice depends on the specific structural requirements
3. True: Unit conversion is essential when working with reinforcement steel, as it helps ensure accurate measurements.
4. True: Deduction for bends is the extra length added to reinforcement bars to accommodate bending.
5. False: Interpreting a Bar Bending Schedule (BBS) is necessary for successful construction projects. It provides critical information about the reinforcement requirements and specifications for the project, ensuring that the work aligns with design standards.

Notes



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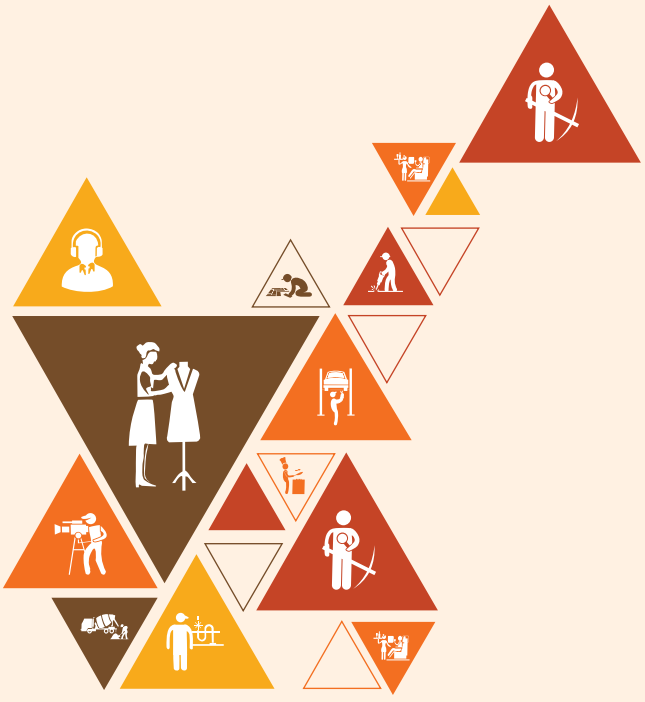
4. Using Hand and Power Tools for Cutting and Bending of Reinforcement

UNIT 4.1: Reinforcement Bars

UNIT 4.2: Tools and Machines required

UNIT 4.3: Reinforcement Cutting and Bending

UNIT 4.4: Storage and Handling of Bars



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Key Learning Outcomes

At the end of this module, you will be able to:

- List the hand and power tools used for measuring, marking, cutting, and bending of reinforcement bars.
- Arrange the tools and required material resources.
- Explain the use of CNC machine for reinforcement works.
- Recognize accessories used for reinforcement cutting and bending machine.
- Select accessories to be fixed on the bending machine based on the diameter of reinforcement bar, shape and angle of the bend etc.
- Describe the method of placing reinforcement bars in different types of machine, for cutting and bending.
- Demonstrate the use of marking tools to mark cutting length on reinforcement bars.
- Demonstrate the use of hammer and chisel, cutting machine, and other cutting tools to cut reinforcement.
- Demonstrate the use of bending lever and bending machine to bend reinforcement bar as per shape and dimension given in BBS.
- Explain the importance of maintaining correct body posture while cutting and bending the reinforcement bars.
- Describe the standard procedure for tagging and stacking of reinforcement bars.
- Demonstrate tagging and stacking of reinforcement bars as per standard procedure.
- List the electrical safety measures to be adopted while working with power tools.

UNIT 4.1: Reinforcement Bars

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Know about rebars
- Know about classification of rebars
- Calculate diameter and unit weight of bars

Resources to be Used

- Theory
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- Practical
  - 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, Threading machine, Reinforcement steel bar, Binding wires, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit

Do

- Know about rebars
- Know about classification of rebars
- Calculate diameter and unit weight of bars

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 4.1 to explain Reinforcement Bars.
- Rebars, short for “reinforcement bars,” are essential components in reinforced concrete structures. They provide tensile strength to concrete, enhancing its structural integrity. Rebars are typically made of carbon steel and come in various sizes and shapes. Commonly, they are cylindrical with ridges along the surface to improve the bond with concrete. Rebars are a critical element in construction, ensuring that concrete structures can withstand various loads and environmental conditions.

  Tips: Understand the importance of selecting the right type and size of rebars for a given construction project. Knowledge of rebars’ properties and characteristics is fundamental to quality concrete work.

- Rebars are classified based on their physical characteristics, such as shape, size, and surface pattern. The two primary classifications are:
  - Based on Shape: Rebars can be classified as plain round bars, deformed bars (with deformations or ridges for improved bonding), and various specialty shapes, including square and rectangular.
  - Based on Size: Rebars are categorized by their diameter, measured in millimeters or inches, and are typically labeled with a grade to indicate their tensile strength, such as Fe415 or Fe500.

Tips: Familiarize yourself with the different types of rebars and their applications. Understanding the size and grade of rebars is essential for accurate construction work.

- Diameter and unit weight calculations are essential when working with rebars. Diameter is straightforward to measure, but unit weight (weight per unit length) requires a formula:
    - Diameter Calculation: Diameter = Circumference / π (π is approximately 3.14159)
    - Unit Weight Calculation: Unit Weight = (π * Diameter² * Density) / 4

Density varies depending on the material used for the rebar, but it is typically around 7850 kg/m³ for carbon steel.

Tips: When calculating diameters and unit weights, ensure accurate measurements for precise construction work. Consider using reference tables or online calculators for quick calculations.

Activity 4.1.1

Name: "Rebar Knowledge and Calculation Challenge"

Purpose: The purpose of this activity is to enhance the knowledge of bar benders and steel fixers regarding rebars, their classification, and the ability to calculate the diameter and unit weight of bars accurately. This knowledge is essential for precise construction work.

Resources Required:

- Samples of different types and sizes of rebars.
- Measuring tools (rulers or tape measures).
- Calculators.

Tentative Duration: 60-75 minutes

Procedure:

1. **Introduction (5 minutes):**
    - Begin by explaining the importance of understanding rebars and their characteristics in construction work.
    - Emphasize the significance of accurately calculating the diameter and unit weight of bars.
2. **Rebar Classification Presentation (15 minutes):**
    - Show the learners different types of rebars, including plain round bars, deformed bars, and specialty shapes like square and rectangular.
    - Discuss the classification based on shape and size, emphasizing the importance of knowing the grade and diameter of rebars.
3. **Diameter Calculation Exercise (20 minutes):**
    - Provide the learners with samples of rebars of varying diameters.
    - Instruct them to measure the diameter of each rebar using measuring tools.
    - Guide them in calculating the diameter accurately using the formula Diameter = Circumference / π.
4. **Unit Weight Calculation Challenge (15 minutes):**
    - Present the learners with different rebars, specifying their diameter and material density.
    - Challenge them to calculate the unit weight of each rebar using the formula Unit Weight = (π *

Diameter² * Density) / 4.

- Discuss the results and correct any errors in calculations.

5. **Group Discussion (10 minutes):**
    - Facilitate a group discussion where learners share their experiences and insights from the exercise.
    - Encourage questions and clarifications about rebars and calculations.

Expected Outcome:

- Learners will gain a better understanding of rebars, their classification, and the importance of knowing their diameter and unit weight.
- They will develop practical skills in measuring rebar diameter and calculating unit weight, contributing to their proficiency in bar bending and steel fixing.
- The activity will promote knowledge sharing and collaboration among learners, enhancing their overall understanding of construction materials and processes.

UNIT 4.2: Tools and Machines required

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- List the hand and power tools used for measuring, marking, cutting, and bending of reinforcement bars.
- Arrange the tools and required material resources.
- Explain the use of CNC machine for reinforcement works.
- List the electrical safety measures to be adopted while working with power tools.

Resources to be Used

- Theory
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- Practical
  - 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, Threading machine, Reinforcement steel bar, Binding wires, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit

Do

- Explain the hand and power tools used for measuring, marking, cutting, and bending of reinforcement bars.
- Explain the tools and required material resources.
- Explain the use of CNC machine for reinforcement works.
- Explain the electrical safety measures to be adopted while working with power tools.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 4.2 to explain Tools and Machines required.
- Hand and power tools are essential for various tasks in reinforcement work. Some commonly used tools include:
  - Hand Tools: Tape measures, steel rule, chalk line, rebar benders, rebar cutters, pliers, tying wire, and hammers.
  - Power Tools: Angle grinders, electric rebar benders, electric rebar cutters, and impact drills.

  Tips: Ensure that all tools are in good working condition and regularly maintained. Proper training in tool usage is crucial to prevent accidents.

- Efficient organization of tools and material resources is key to a smooth workflow in reinforcement work. Arrange tools and materials logically, ensuring easy access and minimizing the need for unnecessary movement.

Notes

Tips: Use tool belts or organizers to keep essential hand tools within reach. Group similar materials together for easier identification and access.

- CNC (Computer Numerical Control) machines can be used for precision cutting and bending of reinforcement bars. These machines are programmed to follow specific design specifications, ensuring accuracy and reducing manual labor.

  Tips: When using CNC machines, ensure that the programming is accurate and regularly maintain the machine to avoid errors in reinforcement bar processing.

- Working with power tools poses electrical hazards, and safety precautions are vital. Some measures to adopt include:
  - Ensure that power tools have grounded plugs and are connected to a grounded electrical source.
  - Use GFCI (Ground Fault Circuit Interrupter) outlets when working in wet or damp conditions.
  - Inspect power cords for damage and replace them if necessary.
  - Avoid overloading electrical circuits by using appropriate extension cords and outlets.
  - Wear appropriate personal protective equipment (PPE), including insulated gloves and safety goggles.

  Tips: Regularly inspect and maintain power tools and electrical connections to prevent accidents. Always follow manufacturer's safety guidelines when using power tools.

Activity 4.2.1

Name: "Tool Familiarization and Safety Drill"

Purpose: The purpose of this activity is to familiarize bar benders and steel fixers with various hand and power tools used for measuring, marking, cutting, and bending reinforcement bars. Additionally, it aims to educate them about electrical safety measures when working with power tools.

Resources Required

- Hand and power tools commonly used in reinforcement work.
- Safety equipment, including insulated gloves and safety goggles.
- A demonstration area with access to electrical outlets for power tool testing.
- Printed safety guidelines.

Tentative Duration: 90 minutes

Procedure:

1) **Introduction (10 minutes):**
   - Begin by emphasizing the importance of tool knowledge and electrical safety in reinforcement work.
   - Explain the objectives of the activity.
2) **Tool Familiarization (30 minutes):**
   - Display and discuss various hand and power tools used in reinforcement work, including tape measures, rebar cutters, rebar benders, angle grinders, and impact drills.
   - Describe the purpose of each tool, how it is used, and any specific safety precautions associated with it.

- Allow learners to handle and examine the tools, asking questions for clarification.

3) **Tool Arrangement (10 minutes):**
   - Demonstrate how to organize and arrange tools and materials efficiently at a work site.
   - Discuss the benefits of a well-organized workspace, such as increased productivity and safety.
4) **Electrical Safety Presentation (20 minutes):**
   - Provide a presentation on electrical safety measures when working with power tools.
   - Cover topics such as proper grounding, GFCI outlets, inspecting power cords, and the use of personal protective equipment (PPE).
   - Distribute printed safety guidelines for future reference.
5) **Practical Demonstration (10 minutes):**
   - Conduct a practical demonstration of safe tool usage, focusing on power tools.
   - Show how to inspect and connect power cords, use GFCI outlets, and wear PPE.
   - Emphasize the importance of following manufacturer's safety guidelines.
6) **Safety Drill (10 minutes):**
   - Divide learners into pairs or small groups.
   - Provide scenarios involving tool usage and electrical safety hazards.
   - Ask each group to discuss and identify potential hazards and propose safe practices.
7) **Group Discussions (10 minutes):**
   - Reconvene as a group and allow each group to share their findings and safety recommendations.
   - Facilitate discussions on lessons learned and best practices.

Expected Outcome:

- Learners will gain knowledge about various hand and power tools used in reinforcement work and their safe usage.
- They will understand the importance of proper tool arrangement and organization in a work environment.
- Learners will be familiar with electrical safety measures when working with power tools and be able to identify potential hazards.
- The activity will promote a culture of safety and responsible tool handling among bar benders and steel fixers.

Notes

UNIT 4.3: Reinforcement Cutting and Bending

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Recognize accessories used for reinforcement cutting and bending machine.
- Select accessories to be fixed on the bending machine based on the diameter of reinforcement bar, shape and angle of the bend etc.
- Describe the method of placing reinforcement bars in different types of machine, for cutting and bending.
- Demonstrate the use of marking tools to mark cutting length on reinforcement bars.
- Demonstrate the use of hammer and chisel, cutting machine, and other cutting tools to cut reinforcement.
- Demonstrate the use of bending lever and bending machine to bend reinforcement bar as per shape and dimension given in BBS.

Resources to be Used

- Theory
    - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- Practical
    - 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, Threading machine, Reinforcement steel bar, Binding wires, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit

Do

- Explain accessories used for reinforcement cutting and bending machine.
- Demonstrate selection of accessories to be fixed on the bending machine based on the diameter of reinforcement bar, shape and angle of the bend etc.
- Explain the method of placing reinforcement bars in different types of machine, for cutting and bending.
- Explain the use of marking tools to mark cutting length on reinforcement bars.
- Explain the use of hammer and chisel, cutting machine, and other cutting tools to cut reinforcement.
- Explain the use of bending lever and bending machine to bend reinforcement bar as per shape and dimension given in BBS.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 4.3 to explain Reinforcement Cutting and Bending.
- Reinforcement cutting and bending machines often require specific accessories to perform various tasks efficiently. These accessories may include cutting blades, bending dies, guides, and calibration tools.
    - Tips: Familiarize yourself with the accessories available for your specific machine model, and regularly inspect and maintain them to ensure proper functionality.

- The choice of accessories for a bending machine depends on factors such as the diameter of the reinforcement bar, the desired shape and angle of the bend, and the machine's capabilities. Select the appropriate bending die or attachment that matches the requirements of the reinforcement work.
    - Tips: Refer to the machine's user manual or consult with experienced operators to make informed accessory selections.
- Properly placing reinforcement bars in cutting and bending machines is crucial for accurate results. Follow the machine's user manual and safety guidelines to position the bars securely. The machine's guides and stops should be used to ensure precise cuts and bends.
    - Tips: Always wear appropriate personal protective equipment (PPE) and be cautious when handling reinforcement bars near machines.
- Marking tools, such as chalk or markers, are used to indicate the cutting length on reinforcement bars. Accurate marking ensures that bars are cut to the required dimensions.
    - Tips: Use a square or a template to create precise and straight marks on the bars. Double-check the marked lengths before cutting.
- Reinforcement bars may need to be cut to specific lengths during construction. This can be done using tools like a hammer and chisel, a cutting machine, or other cutting tools.
    - Tips: Ensure that cuts are clean, straight, and free of any burrs or sharp edges. Measure and mark the cutting points accurately.
- Bending reinforcement bars to the required shapes and dimensions is a critical aspect of construction. Bending levers and bending machines can be used to achieve precise bends as per the specifications in the Bar Bending Schedule (BBS).
    - Tips: Follow the bending instructions in the BBS carefully, and ensure that the bending machine is properly calibrated. Regularly inspect bending dies and fixtures for wear and tear.

Activity 4.3.1

Name: "Rebar Cutting and Bending Practical Workshop"

Purpose: This practical workshop aims to familiarize bar benders and steel fixers with the accessories and tools used in reinforcement cutting and bending, and to teach them the correct methods for handling and using these tools for various reinforcement tasks.

Resources Required:

- Reinforcement bars of different diameters and lengths.
- Cutting and bending machines with various accessories.
- Marking tools (chalk or markers).
- Safety equipment, including gloves, safety goggles, and helmets.
- Hammer and chisel.
- Cutting machine.
- Bending lever and bending machine.
- A designated workshop area with adequate ventilation and safety measures in place.

Tentative Duration: 4-6 hours (can be divided into multiple sessions)

Procedure:

1. **Introduction (15 minutes):**
    - Provide an overview of the workshop's objectives and safety guidelines.
    - Emphasize the importance of accuracy and safety in reinforcement cutting and bending.
2. **Accessory Recognition (20 minutes):**

- Display and explain the various accessories used for cutting and bending machines.
- Describe the specific purposes and applications of each accessory.
- Allow learners to handle and inspect the accessories.

3. **Accessory Selection Exercise (20 minutes):**
   - Provide reinforcement bars of different diameters and shapes.
   - Instruct learners to select appropriate accessories based on the requirements, such as the diameter, shape, and angle of the bend.
   - Discuss their choices and provide feedback.
4. **Reinforcement Placement Demonstration (30 minutes):**
   - Demonstrate the correct method of placing reinforcement bars in different types of machines for cutting and bending.
   - Show how to use machine guides and stops for precise positioning.
   - Allow learners to practice under supervision.
5. **Marking Tools and Cutting Exercise (60 minutes):**
   - Explain the use of marking tools to mark cutting lengths on reinforcement bars accurately.
   - Provide reinforcement bars with marked cutting lengths.
   - Demonstrate the use of a hammer and chisel, cutting machine, and other cutting tools to cut reinforcement bars to the specified lengths.
   - Supervise learners as they practice cutting.
6. **Bending Exercise (60 minutes):**
   - Explain the importance of following the bending instructions provided in the Bar Bending Schedule (BBS).
   - Provide reinforcement bars with bending requirements from the BBS.
   - Demonstrate the use of a bending lever and bending machine to achieve the specified bends.
   - Supervise learners as they practice bending.
7. **Q&A and Discussion (30 minutes):**
   - Allow learners to ask questions and seek clarification on any aspects of cutting and bending.
   - Discuss common challenges and solutions.
8. **Expected Outcome:**
   - Learners will acquire hands-on experience in selecting the right accessories for cutting and bending machines.
   - They will be proficient in placing reinforcement bars correctly in machines, marking cutting lengths accurately, and using tools for cutting and bending.
   - The workshop will instill a strong understanding of safety practices and the importance of precision in reinforcement work.

Notes

UNIT 4.4: Storage and Handling of Bars

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Explain the importance of maintaining correct body posture while cutting and bending the reinforcement bars.
- Describe the standard procedure for tagging and stacking of reinforcement bars.
- Demonstrate tagging and stacking of reinforcement bars as per standard procedure.

Resources to be Used

- Theory
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- Practical
  - 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, Threading machine, Reinforcement steel bar, Binding wires, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit

Do

- Explain the importance of maintaining correct body posture while cutting and bending the reinforcement bars.
- Explain the standard procedure for tagging and stacking of reinforcement bars.
- Demonstrate tagging and stacking of reinforcement bars as per standard procedure.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 4.4 to explain Storage and Handling of Bars.
- Maintaining correct body posture while cutting and bending reinforcement bars is crucial for several reasons:
  - Injury Prevention: Correct posture reduces the risk of musculoskeletal injuries, such as strains and sprains, which can result from improper lifting or bending motions.
  - Efficiency: Good posture allows workers to perform tasks more efficiently, minimizing fatigue and increasing productivity.
  - Accuracy: Proper posture ensures that cuts and bends are made accurately, reducing errors and rework.

  Tips:
  - Bend at the knees, not at the waist, when lifting or bending.
  - Keep the back straight and use the legs to power movements.
  - Use mechanical aids like lifting devices when handling heavy reinforcement bars.
  - Take regular breaks to stretch and rest.

- The standard procedure for tagging and stacking reinforcement bars involves the following steps:
    - Tagging: Attach tags or labels to each reinforcement bar with essential information such as bar diameter, length, and shape of the bend (if applicable). This information helps ensure proper identification and placement during construction.
    - Sorting: Group reinforcement bars by size and type, placing similar bars together to facilitate easy access and retrieval.
    - Stacking: Stack the tagged and sorted bars in a designated storage area, ensuring that stacks are stable and secure. Leave adequate space between stacks to prevent accidental toppling.
    - Protection: Cover the stacked bars with suitable materials or tarpaulins to protect them from environmental factors like rain and corrosion.
    - Documentation: Maintain records of the tagged bars, including their quantities and specifications, for inventory and quality control purposes.

  Tips:
    - Use durable, weather-resistant tags or labels that won't easily deteriorate.
    - Clearly mark any special instructions, such as bar orientation or specific usage requirements.
    - Regularly inspect stacked bars for signs of damage or corrosion.
- To demonstrate tagging and stacking of reinforcement bars as per the standard procedure:
    - Show how to attach tags or labels to bars, ensuring that all necessary information is included.
    - Arrange a selection of reinforcement bars by size and type, explaining the logic behind the grouping.
    - Physically stack the bars, emphasizing stability and proper spacing between stacks.
    - Discuss the importance of covering and protecting the stacked bars.
    - Provide examples of documentation and record-keeping practices.

  Tips:
    - Encourage hands-on practice for learners to reinforce the correct procedures.
    - Highlight the role of teamwork in maintaining an organized and efficient reinforcement storage area.

Exercise:

Key Solutions to PHB Exercise:

Short Questions:

1) The primary hand and power tools used for measuring, marking, cutting, and bending reinforcement bars include tape measures, chalk or markers, rebar cutters, rebar benders, angle grinders, and impact drills.
2) To arrange tools and required material resources efficiently for reinforcement work, tools should be organized logically and within easy reach. Similar materials should be grouped together to minimize unnecessary movement.
3) A CNC machine contributes to reinforcement work by automating the cutting and bending of reinforcement bars. It can precisely follow design specifications, reducing manual labor and ensuring accuracy. Tasks include cutting bars to length, creating specific bends, and producing custom shapes.
4) Common accessories used with reinforcement cutting and bending machines include cutting blades, bending dies, guides, and calibration tools.
5) To select appropriate accessories for a bending machine, consider factors such as the diameter and shape of the reinforcement bar, the required angle of the bend, and the machine's capabilities.

Fill-in-the-Blanks:

1) The correct tools for marking cutting length on reinforcement bars are chalk or markers.
2) When cutting reinforcement bars, workers can use a hammer and chisel for manual cutting or a cutting machine for a more precise cut.
3) To bend reinforcement bars according to the required shape and dimensions, a worker can use a bending lever or a bending machine.
4) Maintaining correct body posture when cutting and bending reinforcement bars is crucial to prevent strain and injuries.
5) The standard procedure for tagging and stacking reinforcement bars helps ensure organization and traceability.

True/False Questions:

1) **False:** A CNC machine is primarily used for cutting and bending reinforcement bars on construction sites, but its use may vary depending on the specific project requirements.

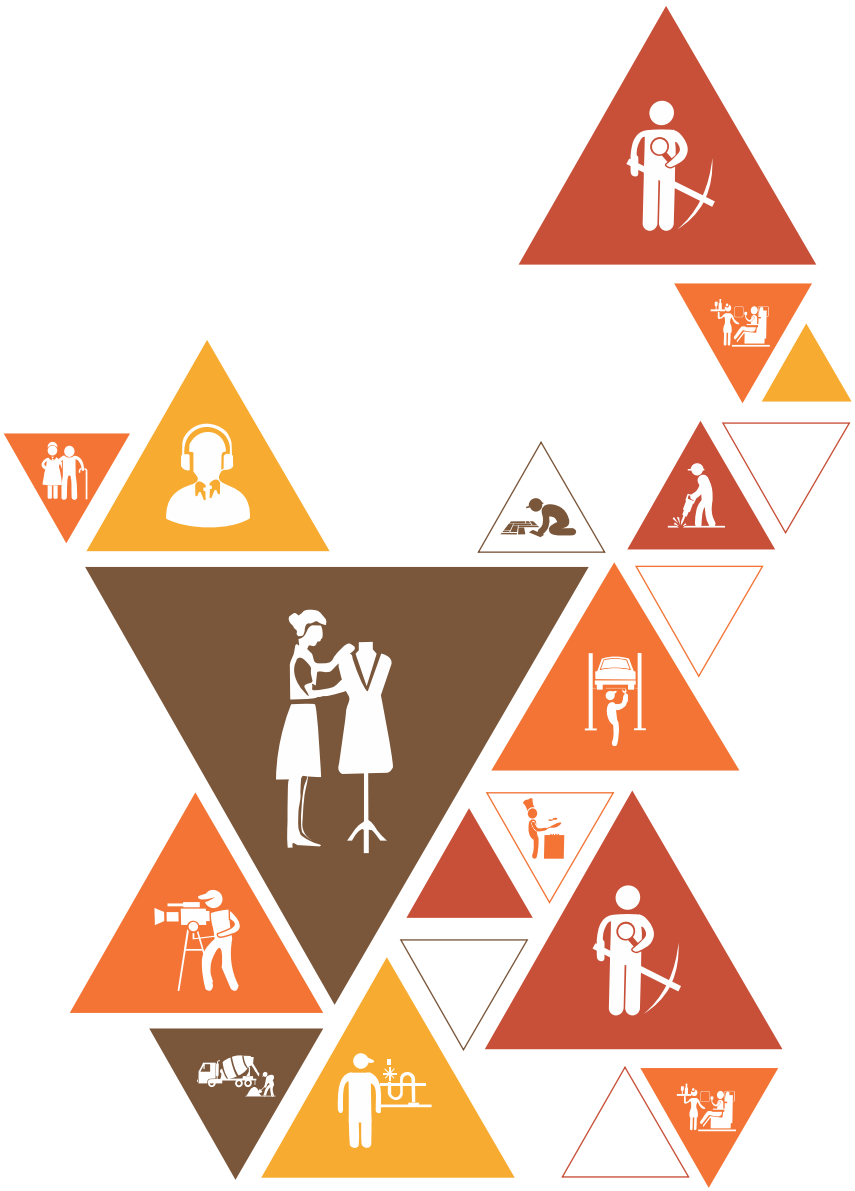
2) **False:** The selection of accessories for a bending machine depends on factors beyond the diameter of the reinforcement bar, such as the shape of the bend and the machine's capabilities.

3) **True:** Workers should prioritize maintaining correct body posture while handling reinforcement bars to prevent injuries and strain.

4) **False:** The standard procedure for tagging and stacking reinforcement bars is essential for construction safety and quality, as it helps maintain organization and traceability.

5) **False:** Electrical safety measures are necessary when working with power tools on construction sites to prevent accidents and ensure worker safety.

Notes



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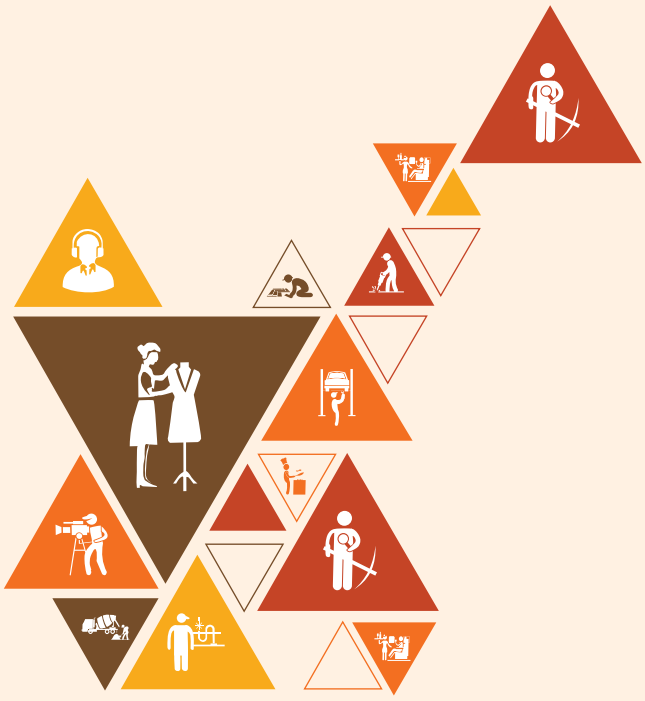
5. Prepare Reinforcement Components for Cage/ Mesh Fabrication of the R.C.C Structures

UNIT 5.1: Understanding Reinforcement Bars

UNIT 5.2: Features of Reinforcement and Interpretation

UNIT 5.3: Reinforcement Preparation and Handling



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Key Learning Outcomes

At the end of this module, you will be able to:

- Distinguish between the different type of reinforcement bars based on type of materials/ range of strength such as Mild Steel, TOR steel, TMT steel, and their application.
- Discuss various features of One-way slab and Two-way Slab.
- Interpret drawings, sketches and BBS to get the details of reinforcement components required for the cage fabrication of various RCC structures.
- Demonstrate cutting and bending of the reinforcement bar to prepare the materials for the cage fabrication as per the required RCC structure.
- Describe the requirements and methods for providing lap joints to the reinforcement bars.
- Calculation of lap length and development length for different diameter of reinforcement bars.
- Demonstrate lapping of reinforcement for different diameter of reinforcement bars.
- Explain the use and benefits of mechanical couplers.
- Explain threading of reinforcement bars for coupler installation.
- Demonstrate fixing of mechanical couplers as per drawing/BBS.
- Perform tagging and stacking of prepared reinforcement materials as per the standard procedure.

UNIT 5.1: Understanding Reinforcement Bars

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Distinguish between the different types of reinforcement bars based on material and strength, such as Mild Steel, TOR steel, TMT steel, and their application.
- Explain the use and benefits of mechanical couplers.
- Explain threading of reinforcement bars for coupler installation.

Resources to be Used

- Theory
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- Practical
  - Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit

Do

- Explain the different types of reinforcement bars based on material and strength, such as Mild Steel, TOR steel, TMT steel, and their application.
- Explain the use and benefits of mechanical couplers.
- Explain threading of reinforcement bars for coupler installation.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 5.1 to explain Understanding Reinforcement Bars.
- Different Types of Reinforcement Bars:
  - Mild Steel (MS) Bars: These are plain, carbon steel bars with a smooth surface. They are commonly used for smaller-scale construction projects and have lower tensile strength compared to other types. MS bars are suitable for low-stress applications, such as residential buildings and small structures.
  - TOR (Twisted Old Rib) Steel Bars: TOR steel bars have longitudinal ribs twisted around the surface. The twisting provides better bond strength with concrete and enhances their load-carrying capacity. They are used in medium-stress applications, such as bridges, dams, and medium-rise buildings.
  - TMT (Thermo-Mechanically Treated) Steel Bars: TMT bars undergo a specialized manufacturing process that involves controlled cooling after hot rolling. This process imparts superior strength and ductility to the bars. TMT bars are widely used in high-stress applications, including high-rise buildings, industrial structures, and infrastructure projects.

Tips:

- Selection of reinforcement bars should be based on the structural requirements and design specifications of the project.
- Consult structural engineers and follow local building codes to determine the appropriate type of reinforcement bars for a specific application.

- Mechanical couplers are devices used to connect two reinforcement bars without the need for overlapping. They are commonly employed in reinforced concrete structures to simplify construction and reduce the congestion of bars at junctions.

  Benefits:

  - Time and Labor Savings: Mechanical couplers eliminate the need for manual bar splicing, saving time and reducing labor costs.
  - Enhanced Structural Integrity: Properly installed couplers maintain the load-carrying capacity of reinforcement bars and ensure structural integrity.
  - Reduced Bar Congestion: Couplers reduce congestion at intersections, making it easier to pour concrete and ensuring proper concrete cover.
  - Improved Aesthetic Finish: Couplers can lead to cleaner and more aesthetically pleasing concrete surfaces.

  Tips:

  - Ensure that the selected mechanical couplers meet the design and strength requirements of the project.
  - Follow manufacturer guidelines and industry standards for the installation of couplers to ensure their effectiveness.

- Threading involves creating threads (screw-like grooves) on the ends of reinforcement bars to facilitate their connection with mechanical couplers.

  Procedure:

  - Use a threading machine or equipment designed for bar threading.
  - Secure the bar in the machine and adjust it to the desired thread length.
  - Rotate the bar against a threading tool, which creates the threads on the bar's end.
  - Ensure that the threaded portion meets the manufacturer's specifications for the mechanical coupler to be used.

  Tips:

  - Threading should be performed by trained personnel using appropriate machinery to ensure accuracy and consistency.
  - Inspect the threaded ends for any defects or irregularities before coupling.

Activity 5.1.1

Name: "Reinforcement Bar Types, Mechanical Couplers, and Threading Workshop"

Purpose: This workshop aims to educate bar benders and steel fixers on the different types of reinforcement bars, the use of mechanical couplers, and the threading process for coupler installation. The objective is to enhance their knowledge and skills in selecting, connecting, and preparing reinforcement bars for construction projects.

Resources Required:

- Samples of Mild Steel (MS), TOR Steel, and TMT Steel reinforcement bars.
- Mechanical couplers and threading equipment.
- Workshop space with demonstration stations.
- Safety gear, including gloves, safety goggles, and helmets.

Tentative Duration: 4-5 hours (can be divided into segments)

Procedure:

1) **Introduction (15 minutes):**
    - Provide an overview of the workshop's objectives and the importance of understanding reinforcement bar types, mechanical couplers, and threading.
    - Emphasize safety guidelines for handling materials and equipment.
2) **Reinforcement Bar Types Presentation (30 minutes):**
    - Display and explain samples of MS, TOR Steel, and TMT Steel reinforcement bars.
    - Describe the properties, strengths, and typical applications of each type.
    - Discuss how to identify and differentiate between these bars on construction sites.
3) **Mechanical Couplers Discussion (20 minutes):**
    - Introduce mechanical couplers and their role in reinforcement bar connections.
    - Explain the benefits of using couplers, such as time savings, reduced labor, and improved structural integrity.
    - Highlight the importance of selecting the right coupler for specific projects.
4) **Threading Demonstration (45 minutes):**
    - Set up a threading station with appropriate equipment.
    - Demonstrate the threading process on reinforcement bars, explaining each step.
    - Provide hands-on experience to learners, allowing them to practice threading under supervision.
5) **Coupler Installation (20 minutes):**
    - Show how to properly install a mechanical coupler on threaded reinforcement bars.
    - Explain the torque or tensioning requirements to achieve the desired connection strength.
    - Address common challenges and troubleshooting.
6) **Q&A and Discussion (30 minutes):**
    - Encourage learners to ask questions and seek clarification on reinforcement bars, couplers, and threading.
    - Facilitate discussions on real-world applications and scenarios.

Expected Outcome:

- Learners will gain a solid understanding of different reinforcement bar types, their strengths, and suitable applications.
- They will grasp the benefits of using mechanical couplers and the threading process for coupler installation.
- Practical experience will enable them to thread reinforcement bars and install couplers effectively.
- Participants will leave with improved knowledge and skills for their role as bar benders and steel fixers in construction projects.

Notes

UNIT 5.2: Features of Reinforcement and Interpretation

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Discuss various features of One-way slab and Two-way Slab.
- Interpret drawings, sketches, and BBS to get the details of reinforcement components required for the cage fabrication of various RCC structures.

Resources to be Used

- Theory
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- Practical
  - Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit

Do

- Explain various features of One-way slab and Two-way Slab.
- Demonstrate drawings, sketches, and BBS to get the details of reinforcement components required for the cage fabrication of various RCC structures.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 5.2 to explain Features of Reinforcement and Interpretation.
- Features of One-way Slab and Two-way Slab:
  - One-way Slab:
    - Span Direction: One-way slabs are designed to span in only one direction, typically supported by walls or beams along two opposite sides.
    - Load Distribution: The load is primarily distributed in the perpendicular direction to the supporting walls or beams.
    - Reinforcement: One-way slabs require reinforcement bars (rebars) primarily in the span direction, i.e., parallel to the shorter side of the slab.
    - Common Applications: One-way slabs are suitable for narrow spans, such as residential buildings, balconies, and corridors.
  - Two-way Slab:
    - Span Direction: Two-way slabs are designed to span in both directions, supported by beams or walls on all four sides.
    - Load Distribution: Loads are distributed in both the longitudinal and transverse directions, spreading the load uniformly across the slab.

        - Reinforcement: Two-way slabs require reinforcement bars in both the longitudinal and transverse directions to resist bending and shear forces.
        - Common Applications: Two-way slabs are used for larger spans, such as in commercial and industrial buildings, bridges, and larger residential structures.
    - Tips:
        - When interpreting drawings and sketches, identify whether the slab is one-way or two-way to understand the reinforcement requirements correctly.
        - Follow structural engineering and architectural drawings to determine the size, spacing, and placement of reinforcement bars in slabs.
- Interpreting Drawings, Sketches, and BBS for Reinforcement Details:
    - Drawings and Sketches:
        - Components: Examine the drawings or sketches to identify key components such as beams, columns, walls, and slabs.
        - Dimensions: Understand the dimensions and layout of the structure, including the lengths, widths, and thicknesses of slabs.
        - Reinforcement Details: Look for specific reinforcement details, including bar sizes, spacings, and bending schedules, indicated by symbols, annotations, and notes.
        - Connections: Identify how different structural elements are connected, as this affects the placement of reinforcement bars.
    - BBS (Bar Bending Schedule):
        - Bar Sizes: Refer to the BBS to determine the sizes of reinforcement bars used in various structural components.
        - Quantities: Note the quantities of each bar size required for cage fabrication.
        - Bend Details: Understand the bending details, including the dimensions and angles of bends.
        - Placement: Pay attention to the placement and spacing of reinforcement bars within each structural element.
    - Tips:
        - Carefully review all available documents, including architectural plans, structural drawings, and BBS, to cross-reference and confirm reinforcement details.
        - Seek clarification from engineers or supervisors if any information is unclear or discrepancies are found.
        - Use the information gathered to accurately prepare and assemble the required reinforcement cage for the respective RCC structure, ensuring compliance with design specifications and construction standards.

Activity 5.2.1

Name: "Slab Features and Reinforcement Interpretation Workshop"

Purpose: This workshop aims to familiarize bar benders and steel fixers with the features of one-way and two-way slabs and enhance their skills in interpreting drawings, sketches, and Bar Bending Schedules (BBS) to determine the reinforcement components required for cage fabrication in various Reinforced Concrete (RCC) structures.

Resources Required:

- Structural drawings and sketches representing different types of slabs.
- Examples of BBS documents.

- Whiteboard or screen for presentations.
- Marker pens.
- Samples of reinforcement bars (rebars) for visual reference.

Tentative Duration: 4 hours (can be divided into segments)

Procedure:

1. **Introduction (15 minutes):**
    - Briefly explain the objectives of the workshop: understanding slab features and developing skills in interpreting reinforcement details from drawings and BBS.
    - Emphasize the importance of accuracy in reinforcement work for structural integrity.
2. **Slab Features Presentation (30 minutes):**
    - Present features of one-way and two-way slabs using visual aids and examples.
    - Discuss differences in span direction, load distribution, and reinforcement requirements for each type.
    - Highlight real-world applications of one-way and two-way slabs.
3. **Interpreting Drawings and Sketches (45 minutes):**
    - Provide learners with copies of structural drawings and sketches depicting various types of slabs.
    - Encourage participants to identify slab types, dimensions, and reinforcement components present in the drawings.
    - Facilitate group discussions to share observations and interpretations.
4. **BBS Interpretation (45 minutes):**
    - Show samples of BBS documents typically used in construction projects.
    - Explain how to read BBS, including bar sizes, quantities, spacings, and bend details.
    - Demonstrate how to cross-reference BBS information with drawings to determine reinforcement placement.
5. **Hands-On Practice (60 minutes):**
    - Divide learners into small groups.
    - Distribute additional drawings, sketches, and BBS documents.
    - Instruct groups to independently interpret the documents and identify the reinforcement components required for cage fabrication.
    - Encourage learners to ask questions and seek guidance as needed.
6. **Presentation and Discussion (30 minutes):**
    - Each group presents its findings, discussing the slab type and reinforcement details they identified.
    - Facilitate discussions on any challenges faced and lessons learned during the interpretation exercise.
7. **Wrap-up and Q&A (15 minutes):**
    - Summarize key takeaways from the workshop, emphasizing the importance of accurate interpretation in reinforcement work.
    - Allow participants to ask questions and seek clarification on any topics covered.

Expected Outcome:

- Learners will gain a solid understanding of the features of one-way and two-way slabs, their applications, and the differences in reinforcement requirements.
- They will develop skills in interpreting drawings, sketches, and BBS documents to accurately determine

the reinforcement components needed for cage fabrication in various RCC structures.

- Participants will leave with improved confidence and competence in their roles as bar benders and steel fixers, contributing to the successful execution of construction projects.

Notes

UNIT 5.3: Reinforcement Preparation and Handling

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Demonstrate cutting and bending of the reinforcement bar to prepare the materials for the cage fabrication as per the required RCC structure.
- Describe the requirements and methods for providing lap joints to the reinforcement bars.
- Calculation of lap length and development length for different diameter of reinforcement bars.
- Demonstrate lapping of reinforcement for different diameter of reinforcement bars.
- Perform tagging and stacking of prepared reinforcement materials as per the standard procedure.

Resources to be Used

- Theory
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- Practical
  - Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit

Do

- Demonstrate cutting and bending of the reinforcement bar to prepare the materials for the cage fabrication as per the required RCC structure.
- Explain the requirements and methods for providing lap joints to the reinforcement bars.
- Calculation of lap length and development length for different diameter of reinforcement bars.
- Demonstrate lapping of reinforcement for different diameter of reinforcement bars.
- Explain tagging and stacking of prepared reinforcement materials as per the standard procedure.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 5.3 to explain Reinforcement Preparation and Handling.
- Cutting and Bending of Reinforcement Bars:
  - Purpose: This skill involves cutting and bending reinforcement bars to the required dimensions and shapes for cage fabrication in RCC structures.
  - Tips: Use the correct tools, follow bending schedules, and maintain precision to ensure that the bars are prepared accurately for construction.
- Providing Lap Joints to Reinforcement Bars:
  - Purpose: Lap joints are essential for connecting two reinforcement bars to maintain structural integrity. Proper lap joints ensure that load transfer occurs effectively.

- Requirements: Follow engineering specifications for lap length, ensure bars are clean and free from rust and dirt, and align bars correctly.
- Tips: Use appropriate lap length calculations, ensure adequate overlap, and secure bars tightly to prevent slippage.

- Calculation of Lap Length and Development Length:
  - Purpose: Calculating lap and development lengths ensures that reinforcement bars provide the necessary strength and anchorage in concrete.
  - Requirements: Understand the concrete's strength, bar diameter, and specific project requirements for accurate calculations.
  - Tips: Refer to structural design codes and guidelines for lap and development length formulas.
- Demonstrating Lapping of Reinforcement Bars:
  - Purpose: Lapping reinforcement bars correctly is crucial for maintaining structural stability and load-bearing capacity.
  - Requirements: Follow design specifications and ensure bars are clean, properly aligned, and securely tied.
  - Tips: Provide sufficient overlap, use appropriate lap splices, and follow recommended bending and tying techniques.
- Tagging and Stacking of Prepared Reinforcement Materials:
  - Purpose: Proper tagging and stacking ensure that reinforcement materials are organized, easily identifiable, and ready for use during construction.
  - Requirements: Use tags, labels, and a standardized stacking system based on project specifications.
  - Tips: Keep reinforcement materials clean, protect them from environmental factors, and maintain an organized storage area to prevent damage and confusion.

Activity 5.3.1

Name: "Reinforcement Preparation and Handling Workshop"

Purpose: This workshop is designed to train bar benders and steel fixers in the essential skills required for preparing reinforcement materials and ensuring their proper handling. It covers cutting, bending, lap joint provision, calculations, and tagging and stacking procedures.

Resources Required:

- Reinforcement bars of various diameters.
- Cutting and bending tools (rebar cutter, bending machine).
- Calculation reference materials (lap length tables).
- Tags, labels, and markers.
- Sample drawings and sketches.

Tentative Duration: 6 hours (can be divided into segments)

Procedure:

1) Introduction (15 minutes):
   - Explain the workshop's objectives: mastering reinforcement preparation and handling skills.
   - Emphasize the importance of precision and safety in these tasks.
2) Demonstration: Cutting and Bending (45 minutes):
   - Demonstrate the correct techniques for cutting and bending reinforcement bars.

- Highlight the use of tools and the importance of accuracy in preparing materials.
- Allow learners to ask questions and observe closely.

3) Lap Joint Explanation (30 minutes):
   - Discuss the purpose and requirements of lap joints in reinforcement.
   - Explain the methods for providing lap joints and their importance in structural stability.
4) Calculation Exercise (45 minutes):
   - Provide lap length calculation exercises for different diameter reinforcement bars.
   - Guide learners through calculations using reference materials.
   - Check and discuss the solutions as a group.
5) Hands-On Practice: Lapping (60 minutes):
   - Distribute reinforcement bars of various diameters.
   - Instruct learners to create lap joints according to specified lap lengths.
   - Provide guidance and supervision as they work.
   - Encourage them to label and tag the lap joints correctly.
6) Tagging and Stacking (45 minutes):
   - Explain the standard procedure for tagging and stacking reinforcement materials.
   - Demonstrate proper labeling and stacking techniques.
   - Allow learners to practice tagging and stacking on sample reinforcement bars.
7) Group Activity: Real-Life Scenario (60 minutes):
   - Divide learners into small groups.
   - Provide drawings of an RCC structure.
   - Ask each group to identify the reinforcement requirements, including cutting, bending, lap joints, and tagging.
   - Groups present their findings, and discussions follow.
8) Q&A and Wrap-Up (15 minutes):
   - Encourage participants to ask questions and seek clarification on any topic covered.
   - Summarize the key takeaways and emphasize the significance of these skills in construction.

Expected Outcome:

- Learners will acquire practical skills in cutting and bending reinforcement bars.
- They will understand the principles and calculations for lap joints.
- Participants will demonstrate proficiency in lapping reinforcement bars and correctly tagging and stacking materials.
- The workshop will equip bar benders and steel fixers with the knowledge and expertise needed to contribute effectively to the preparation and handling of reinforcement materials for RCC structures.

Exercise:

Key Solutions to PHB Exercise:

Short Questions:

1) The primary difference between Mild Steel and TMT steel reinforcement bars lies in their material properties, with TMT steel bars being known for their high strength and better corrosion resistance.
2) One-way slabs are typically used in situations where loads primarily apply in one direction, such as floors. Two-way slabs distribute loads in both the longitudinal and transverse directions.
3) Accurate interpretation of construction drawings and Bar Bending Schedules (BBS) is crucial to ensure that the reinforcement components required for cage fabrication in RCC structures are correctly identified and placed.
4) The key steps involved in bending reinforcement bars include measuring and marking the required bend length, securing the bar in a bending machine, applying the desired angle of bend, and ensuring a clean and precise bend.
5) Proper lap joints are important in reinforced concrete structures to ensure load transfer between overlapping bars, maintain structural strength, and prevent potential failure.

Fill-in-the-Blanks:

1. TOR steel reinforcement bars are known for their high strength and are commonly used in bridge applications.
2. One-way slabs are designed to primarily support loads in the longitudinal direction, while two-way slabs distribute loads in two directions.
3. To determine the reinforcement components required for cage fabrication, it's essential to accurately interpret drawings and Bar Bending Schedules (BBS).
4. During the process of cutting and bending reinforcement bars, it's important to ensure perpendicular and clean cuts.
5. The development length for reinforcement bars depends on factors such as the bar diameter and strength of concrete.

True/False:

1) False: TMT steel reinforcement bars are characterized by their high strength and better corrosion resistance but are not necessarily known for their corrosion resistance.
2) False: One-way slabs are suitable for supporting loads primarily in one direction.
3) True: Accurate interpretation of drawings and BBS is indeed essential for successful cage fabrication in RCC structures.
4) False: Lap joints are necessary for maintaining the strength and integrity of reinforced concrete structures.
5) False: Lap length and development length calculations for reinforcement bars are dependent on the diameter of the bars, among other factors.

Notes

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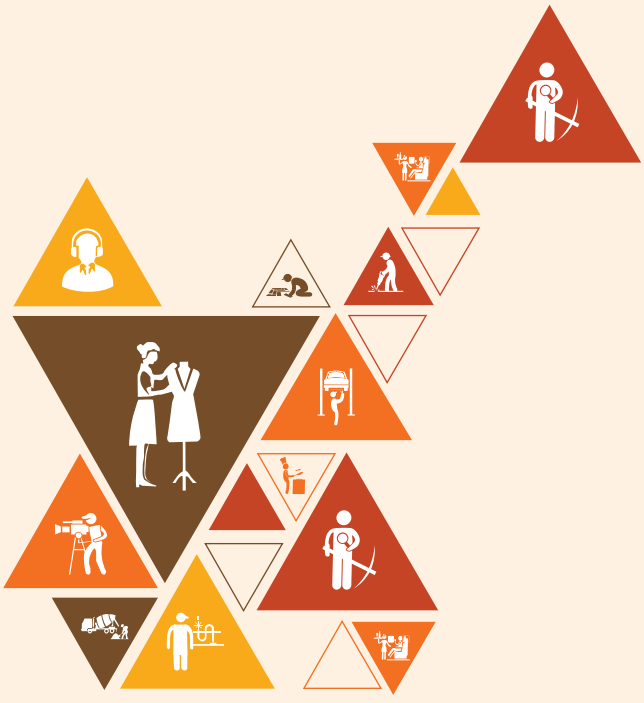
6. Fixing Reinforcement Components to Fabricate Cage/ Mesh for the R.C.C Structures

UNIT 6.1: Interpretation and Classification of Reinforcement Components

UNIT 6.2: Fixing Reinforcement Components and Cage Fabrication

UNIT 6.3: Shifting, Positioning, and Final Fixing



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Key Learning Outcomes

At the end of this module, you will be able to:

- Interpret drawings and sketches prior to fabrication and fixing of reinforcements bars.
- Distinguish between the different type of reinforcement bars based on type of materials/ range of strength such as Mild Steel, TOR steel, TMT steel, and their application.
- Explain the insertion and fixing sequence of different types of R.C.C structural elements such as beam, column, slab, wall, footing, staircase etc.
- Classify the different types of ties based on their use and strength.
- Use different types of ties as per their utilities to fix the different components of the RCC structure.
- Explain the importance of chairs, spacer bars, hanger bars, and cover blocks while cage fabrication and concreting operation for various RCC structures.
- Demonstrate placing and fixing of chairs, spacers and hanger bars.
- Discuss the procedure to shift, position and fix the pre-fabricated cage to its designated place.
- Erect temporary supports/ mark necessary layout required to fabricate cage/ mesh for various RCC structures such as beam, column, slab, wall, footing, staircase etc.
- Demonstrate marking procedures, insertion of different reinforcement components (such as bars, stirrups, bent up bars etc.) and providing initial fixing ties to fabricate the required cage for the various RCC structures such as beam, column, slab, wall, footing, staircase etc. as per the drawing/BBS.
- Demonstrate the shifting, positioning and fixing of pre-fabricated cages as per the requirement.

UNIT 6.1: Interpretation and Classification of Reinforcement Components

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Interpret drawings and sketches prior to fabrication and fixing of reinforcement bars.
- Distinguish between different types of reinforcement bars based on materials and strength.
- Classify the different types of ties based on their use and strength.

Resources to be Used

- Theory
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- Practical
  - Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit

Do

- Interpret drawings and sketches prior to fabrication and fixing of reinforcement bars.
- Explain different types of reinforcement bars based on materials and strength.
- Classify the different types of ties based on their use and strength.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 6.1 to explain Interpretation and Classification of Reinforcement Components.
- Interpreting construction drawings and sketches is a critical skill for bar benders and steel fixers. It involves understanding the structural design, identifying the placement and types of reinforcement bars, and ensuring that the correct specifications are followed. Attention to detail and accuracy in interpreting these documents is crucial to the successful execution of reinforced concrete structures.

  Tips:
  - Study the Drawings: Carefully study the construction drawings to grasp the overall design and layout of the structure.
  - Identify Reinforcement: Pay close attention to symbols, notations, and callouts that indicate the type, diameter, and positioning of reinforcement bars.
  - Understand Details: Focus on details such as lap lengths, clear cover, and spacing requirements.
  - Seek Clarification: If any aspect of the drawings is unclear, seek clarification from supervisors or engineers.

- Follow Codes: Ensure that your interpretation aligns with local building codes and project specifications.

- Reinforcement bars come in various types based on the material composition and strength properties. Common types include Mild Steel (MS), TOR Steel, and Thermo-Mechanically Treated (TMT) Steel. Each type has its advantages and applications, with TMT steel being known for its high strength and improved corrosion resistance.

  Tips:

  - Material Selection: Choose the appropriate type of reinforcement bar based on project requirements and structural design.
  - Understand Strength: Familiarize yourself with the strength properties of each type to ensure they meet structural demands.
  - Consider Corrosion: In corrosive environments, opt for corrosion-resistant options like TMT steel.
  - Follow Specifications: Adhere to project specifications and consult with engineers to select the right type of reinforcement.

- Ties in construction refer to elements used to secure and support reinforcement bars in their proper positions. They are classified based on their purpose and strength. Common tie types include stirrups, binding wires, and spacers, each serving a specific role in maintaining the integrity of reinforced concrete structures.

- Tips:
  - Understand Functions: Learn the roles and functions of various ties, such as stirrups for lateral support and binding wires for securing bars.
  - Proper Placement: Ensure ties are correctly placed and spaced according to design specifications.
  - Select Appropriate Strength: Choose ties with the required strength to withstand loads and maintain reinforcement positions.
  - Secure Ties: Use proper tying techniques to securely fasten reinforcement bars, preventing displacement during concrete placement.
  - Follow Safety Guidelines: Adhere to safety guidelines when handling and using ties, including wearing appropriate personal protective equipment (PPE).

Activity 6.1.1

Name: Interpretation Challenge

Purpose: The purpose of this activity is to enhance the learner's skills in interpreting construction drawings and understanding different types of reinforcement bars and ties.

Resources Required:

- Construction drawings or sketches
- Samples of various reinforcement bars (Mild Steel, TOR Steel, TMT Steel)
- Examples of different types of ties (stirrups, binding wires, spacers)
- Paper and pens for note-taking

- Reference materials or guides on reinforcement and ties

Tentative Duration: 1-2 hours

Procedure:

1) Introduction (10 minutes): Explain the importance of interpreting construction drawings and understanding reinforcement materials and ties. Emphasize how these skills contribute to successful construction work.
2) Interpreting Drawings (20 minutes):
    a. Provide the learners with a set of construction drawings or sketches related to a specific project.
    b. Ask them to individually study the drawings, identifying key details such as reinforcement bar types, placement, and tie locations.
    c. Encourage note-taking to document their observations and questions.
3) Discussion (15 minutes):
    a. Facilitate a group discussion where learners share their observations and interpretations of the drawings.
    b. Clarify any misconceptions or answer questions about the drawings.
4) Reinforcement Bars (20 minutes):
    a. Show samples of different types of reinforcement bars (Mild Steel, TOR Steel, TMT Steel).
    b. Explain the properties and applications of each type.
    c. Allow learners to examine the samples and ask questions.
5) Ties Classification (15 minutes):
    a. Display examples of various ties used in construction, including stirrups, binding wires, and spacers.
    b. Discuss the purposes and strengths of these ties.
    c. Encourage learners to handle the ties and ask questions.
6) Activity (30 minutes):
    a. Provide learners with a new set of construction drawings or sketches.
    b. Ask them to identify reinforcement bar types, placement details, and the use of ties.
    c. Instruct them to classify the ties based on their purpose and strength.
    d. Encourage collaboration and problem-solving among learners.
7) Presentation (15 minutes): Each learner presents their findings and interpretations to the group.
8) Discussion and Feedback (10 minutes): Facilitate a discussion about the challenges and insights gained from the activity.

Expected Outcome: By the end of this activity, learners should have improved their skills in interpreting construction drawings, identifying various types of reinforcement bars, and classifying ties based on their use and strength. They will also have a deeper understanding of how these skills are applied in their role as bar benders and steel fixers.

Notes

UNIT 6.2: Fixing Reinforcement Components and Cage Fabrication

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Explain the insertion and fixing sequence of different types of R.C.C structural elements.
- Use different types of ties to fix the different components of the RCC structure.
- Discuss the importance of chairs, spacer bars, hanger bars, and cover blocks during cage fabrication.
- Demonstrate placing and fixing of chairs, spacers, and hanger bars.

Resources to be Used

- Theory
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- Practical
  - Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit

Do

- Explain the insertion and fixing sequence of different types of R.C.C structural elements.
- Use different types of ties to fix the different components of the RCC structure.
- Explain the importance of chairs, spacer bars, hanger bars, and cover blocks during cage fabrication.
- Explain placing and fixing of chairs, spacers, and hanger bars and demonstrate them.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 6.2 to explain Fixing Reinforcement Components and Cage Fabrication.
- The insertion and fixing sequence of RCC structural elements is a critical aspect of construction. It involves a systematic approach to placing and securing reinforcement bars within various structural components, such as columns, beams, slabs, and footings. Proper sequencing ensures that the reinforcement bars are positioned correctly to meet design specifications and load-bearing requirements.

  Tips:
  - Follow Design Plans: Always refer to the construction drawings and design plans to understand the specific sequence for each structural element.
  - Consider Load Path: Understand the load path and forces acting on each element to determine the most suitable insertion and fixing sequence.
  - Ensure Alignment: Pay attention to alignment and positioning, especially when dealing with vertical and horizontal elements.
  - Coordinate with Team: Collaborate with other team members, including engineers and masons,

to ensure a coordinated approach.

- Inspect and Verify: Regularly inspect the placement of reinforcement bars during the process to confirm compliance with design requirements.

- Different types of ties are employed in RCC structures to secure and maintain the proper positioning of reinforcement bars. These ties include stirrups, binding wires, spacers, and hanger bars. Each type serves a specific purpose, such as providing lateral support, preventing displacement, and ensuring the correct spacing of bars.

  Tips:

  - Understand Tie Functions: Familiarize yourself with the functions of various ties, such as stirrups for beam and column support or binding wires for securing bars at intersections.
  - Proper Placement: Ensure ties are placed at the correct locations and spaced according to design specifications.
  - Secure Ties Adequately: Use proper tying techniques to securely fasten reinforcement bars, preventing movement during concrete placement.
  - Select Appropriate Tie Types: Choose ties that are suitable for the specific structural element and load requirements.

- Chairs, spacer bars, hanger bars, and cover blocks are essential accessories in the construction of reinforced concrete structures. They serve various purposes, such as maintaining the correct cover to reinforcement bars, ensuring proper spacing, preventing sagging, and providing support during concrete pouring. Their correct usage contributes to the structural integrity and durability of RCC elements.

  Tips:

  - Match Accessories to Element: Select chairs, spacer bars, hanger bars, and cover blocks based on the type and size of the structural element being constructed.
  - Follow Design Specifications: Adhere to design specifications to determine the required dimensions and placement of these accessories.
  - Secure Placement: Ensure that chairs, spacer bars, hanger bars, and cover blocks are securely placed and aligned with the reinforcement bars.
  - Inspect Quality: Regularly inspect the quality and condition of these accessories to ensure they meet construction standards.

- Demonstrating the correct placement and fixing of chairs, spacers, and hanger bars is a practical skill that ensures the proper positioning of reinforcement bars within RCC structures. This process involves securing these accessories at specified intervals to maintain the correct cover and spacing of reinforcement.

  Tips:

  - Hands-On Practice: Gain practical experience by physically placing chairs, spacers, and hanger bars in simulated construction scenarios.
  - Precision Matters: Pay attention to precision when positioning these accessories to meet design requirements.
  - Use Appropriate Fastening Techniques: Learn and apply the correct methods for securing chairs, spacers, and hanger bars to the reinforcement bars.
  - Collaborate: Work closely with the construction team to coordinate the placement of these accessories during concrete pouring.

Activity 6.2.1

Name: "Cage Fabrication and Element Sequencing Challenge"

Purpose: The purpose of this activity is to familiarize learners, who are bar benders and steel fixers, with the insertion and fixing sequence of different RCC structural elements, the use of various ties, and the importance of chairs, spacer bars, hanger bars, and cover blocks during cage fabrication. Additionally, this activity aims to develop practical skills in placing and fixing these accessories accurately.

Resources Required:

1) Mockup RCC structural elements (e.g., columns, beams, slabs, footings).
2) Reinforcement bars (mock bars or real ones for practice).
3) Chairs, spacer bars, hanger bars, and cover blocks.
4) Binding wires and tying tools.
5) Safety equipment (gloves, helmets, safety glasses).
6) Measuring tools (tape measures, spirit levels).

Tentative Duration: 2-3 hours, depending on the complexity of the mockup elements.

Procedure:

1) Introduction (15 minutes):
    - Explain the importance of accurate cage fabrication and proper element sequencing in RCC construction.
    - Briefly discuss the role of ties, chairs, spacer bars, hanger bars, and cover blocks in reinforcement.
2) Demonstration (30 minutes):
    - Show learners how to inspect a set of mock RCC structural elements.
    - Explain the correct insertion and fixing sequence for each element, highlighting differences between columns, beams, slabs, and footings.
    - Demonstrate the use of different types of ties (e.g., stirrups, binding wires) to secure the reinforcement bars.
3) Practical Exercise (1.5 - 2 hours):
    - Divide learners into small groups.
    - Provide each group with a set of mock RCC structural elements and reinforcement bars.
4) Instruct them to:
    - Follow the correct insertion and fixing sequence for each element.
    - Use the appropriate ties and techniques to secure the bars.
    - Place chairs, spacer bars, hanger bars, and cover blocks at specified locations.
    - Emphasize the importance of maintaining precision and alignment.
5) Discussion and Review (15 minutes):
    - Gather learners for a group discussion.
    - Review the completed mock elements and reinforcement work.
    - Discuss any challenges faced and lessons learned during the exercise.

Expected Outcome: Learners will gain practical experience in inserting and fixing different RCC structural elements, using various ties, and correctly placing chairs, spacer bars, hanger bars, and cover blocks. They will understand the significance of these processes in ensuring the structural integrity of RCC constructions.

Notes

UNIT 6.3: Shifting, Positioning, and Final Fixing

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Discuss the procedure to shift, position, and fix pre-fabricated cages.
- Erect temporary supports and mark necessary layouts for various RCC structures.
- Demonstrate marking procedures, insertion of different reinforcement components, and providing initial fixing ties to fabricate the required cage.
- Demonstrate the shifting, positioning, and final fixing of pre-fabricated cages as per the requirement.

Resources to be Used

- Theory
  - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts
- Practical
  - Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit

Do

- Explain the procedure to shift, position, and fix pre-fabricated cages.
- Erect temporary supports and mark necessary layouts for various RCC structures.
- Demonstrate marking procedures, insertion of different reinforcement components, and providing initial fixing ties to fabricate the required cage.
- Demonstrate the shifting, positioning, and final fixing of pre-fabricated cages as per the requirement.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 6.3 to explain Shifting, Positioning, and Final Fixing.
- This involves carefully handling pre-fabricated reinforcement cages and ensuring their correct placement within the formwork. It includes using lifting equipment, aligning the cages with the layout markings, and securing them in place before concrete pouring.

  Tips:
  - Use appropriate lifting equipment and ensure it is in good working condition.
  - Follow safety protocols during lifting and positioning.
  - Double-check the alignment with the layout markings before final fixation.

- Temporary supports, like props and scaffolding, are essential to hold reinforcement cages in the correct position before concrete placement. Layout marking involves measuring and marking reference points

and cage positions on the formwork.

Tips:

- Ensure temporary supports are sturdy and level.
- Use accurate measuring tools for layout marking.
- Check layout dimensions' multiple times to avoid errors.

- This step involves marking cutting lengths, bending points, and insertion points for reinforcement components on bars. It also includes placing ties or couplers to temporarily hold bars together before final fixing.

  Tips:

  - Use clear and visible markings.
  - Maintain correct spacing and alignment as per design specifications.
  - Ensure ties are tight but not too tight to allow for adjustments if needed.

- After initial fixing, the cages are shifted into their final positions within the formwork. This step ensures precise placement, and final ties are secured to maintain the cage's shape and alignment during concrete pouring.

  Tips:

  - Carefully monitor the alignment during shifting.
  - Double-check dimensions and alignment before final fixing.
  - Secure all ties firmly but avoid over-tightening, which can deform the cage.

Activity 6.3.1

Name: "Cage Fabrication and Positioning Challenge"

Purpose: The purpose of this activity is to train learners (bar benders and steel fixers) in the procedures involved in shifting, positioning, and fixing pre-fabricated cages for various RCC structures. It also covers erecting temporary supports, marking layouts accurately, inserting reinforcement components, and providing initial fixing ties.

Resources Required:

1) Mock-up RCC structural elements (e.g., columns, beams, slabs).
2) Reinforcement bars (real or mock).
3) Lifting equipment (hoists, cranes, or lifting belts).
4) Temporary supports (props, scaffolding).
5) Measuring and marking tools (tape measures, chalk lines).
6) Binding wires and tying tools.
7) Safety equipment (helmets, gloves, safety harnesses).

Tentative Duration: 2-3 hours, depending on the complexity of the mock RCC elements.

Procedure:

1) **Introduction (15 minutes):**
   - Explain the importance of accurate positioning and fixing of pre-fabricated cages in RCC construction.
   - Highlight the significance of temporary supports and precise layout marking.

2) **Demonstration (30 minutes):**
   - Show learners how to erect temporary supports for various RCC elements, ensuring they are level and stable.
   - Explain the layout marking process, emphasizing the need for accuracy and clear markings.
   - Demonstrate the insertion of different reinforcement components (bars, stirrups) and the initial tying of ties or couplers.
3) **Practical Exercise - Part 1 (1 hour):**
   - Divide learners into small groups.
   - Provide each group with a mock RCC structural element and reinforcement bars.
   - Instruct them to:
     i. Erect temporary supports as per the layout provided.
     ii. Mark layout positions accurately.
     iii. Insert specified reinforcement components and provide initial ties.
4) **Demonstration - Shifting and Positioning (15 minutes):**
   - Show learners how to safely shift and position pre-fabricated cages within the formwork, ensuring alignment with layout markings.
5) **Practical Exercise - Part 2 (45 minutes):**
   - Continue with the small groups.
   - Instruct them to:
     i. Shift the pre-fabricated cage into the correct position within the formwork.
     ii. Double-check alignment and dimensions.
     iii. Provide final fixing ties to secure the cage in place.
6) **Discussion and Review (15 minutes):**
   - Gather learners for a group discussion.
   - Review the completed mock RCC elements and reinforcement work.
   - Discuss any challenges faced and lessons learned during the exercise.

Expected Outcome: Learners will gain hands-on experience in shifting, positioning, and fixing pre-fabricated cages accurately for various RCC structures. They will also understand the importance of erecting temporary supports and marking layouts precisely.

Exercise:

Key Solutions to PHB Exercise:

Short Questions:

1. Interpreting structural drawings and sketches is essential to understand the layout, dimensions, and reinforcement requirements before fixing reinforcement bars. It ensures accurate and compliant construction.
2. Mild Steel (MS) and Thermo-Mechanically Treated (TMT) steel reinforcement bars can be distinguished by their surface appearance and markings. TMT bars have a ribbed surface and specific markings, while MS bars have a plain surface.
3. The insertion and fixing sequence in RCC work depend on the structural design and load distribution. It ensures that the most critical elements are reinforced first to maintain structural integrity.
4. Hanger bars are commonly used to support and suspend vertical reinforcement bars (usually in columns or beams) to maintain proper spacing and alignment during concrete placement.
5. Proper classification of ties based on their use and strength is crucial because different ties are required to secure various components, such as longitudinal bars, stirrups, or links, and ensure structural stability.

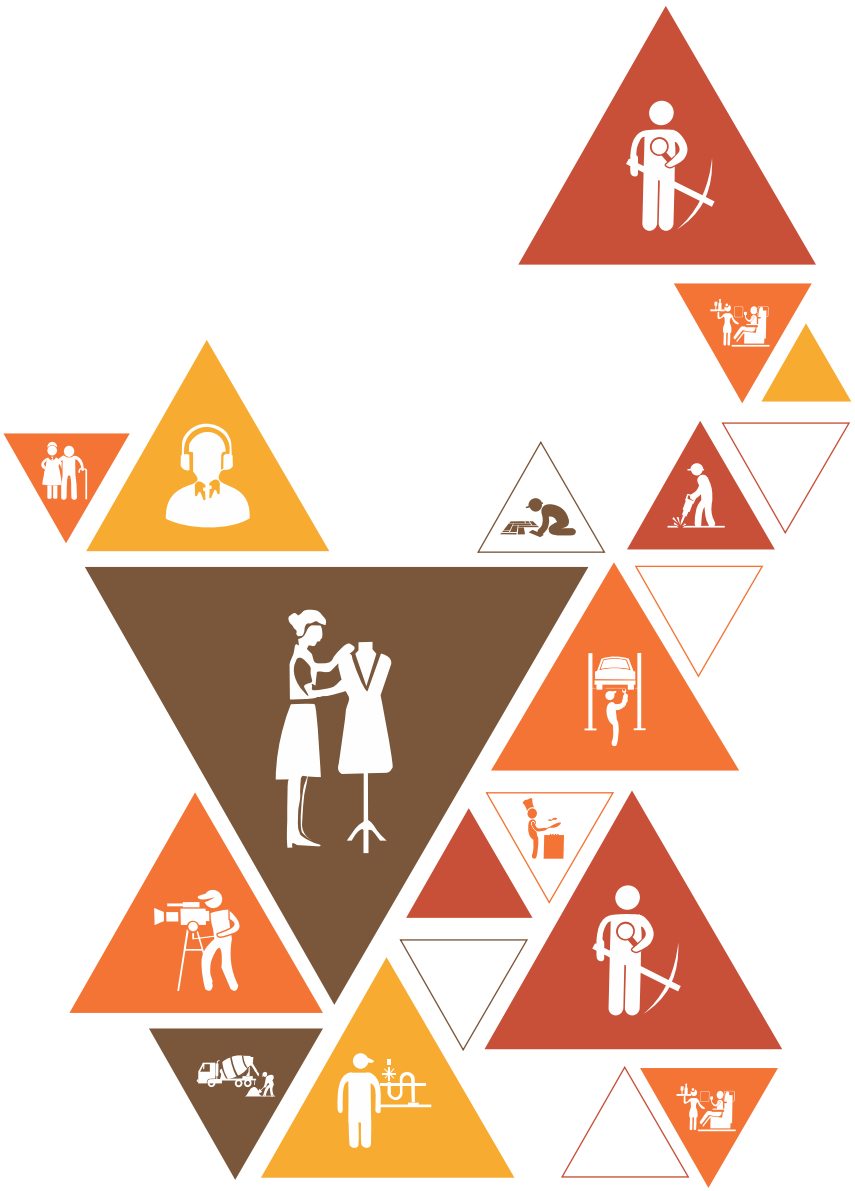
Fill in the Blanks Questions:

1. Chairs, spacer bars, and hanger bars are essential for maintaining alignment during cage fabrication.
2. Different types of ties are used to fix various components in an RCC structure based on their size.
3. Pre-fabricated cages are positioned and fixed in accordance with project requirements.
4. The insertion and fixing sequence of RCC structural elements depends on the design of the construction.
5. The primary purpose of initial fixing ties during cage fabrication is to ensure structural integrity.

True/False Questions:

1. False: Spacer bars are used to maintain proper spacing and alignment of reinforcement bars but do not provide additional structural strength.
2. False: Distinguishing between reinforcement bar types based on materials is essential in RCC construction to ensure the desired properties and performance.
3. False: The insertion and fixing sequence of RCC elements can vary based on the structural design and project-specific requirements.
4. False: Chairs, spacer bars, and hanger bars are primarily used to maintain proper reinforcement placement, not for concrete curing.
5. True: Shifting, positioning, and fixing pre-fabricated cages require consideration of project-specific requirements to ensure proper alignment and structural integrity.

Notes



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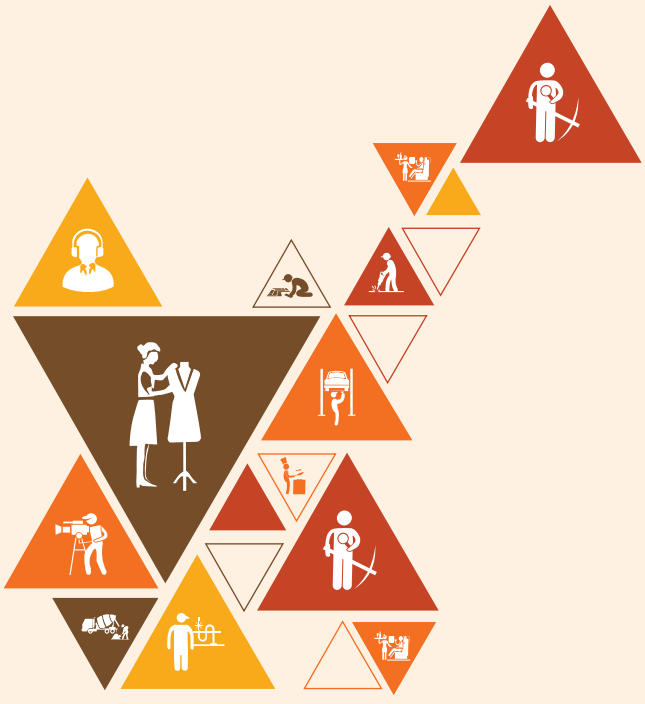
Construction Skill Development Council

7. Communicate Effectively at Workplace

UNIT 7.1: Effective Communication and Teamwork

UNIT 7.2: Working Effectively and Maintaining Discipline at Work

UNIT 7.3: Maintaining Social Diversity at Work



(CON/N8001)

Key Learning Outcomes

At the end of this module, you will be able to:

- Explain the effects and benefits of timely actions relevant to the task at hand with examples.
- Explain the importance of teamwork and its effects relevant to the task at hand with examples.
- Demonstrate teamwork skills during assigned task.
- Explain the importance of proper and effective communication and its adverse effects in case of failure of proper communication.
- Apply effective communication skills while interacting with co-workers, trade seniors and others during the assigned task.
- Use appropriate writing skills and verbal communication reporting as per commonly applicable organisational norms.
- Discuss about gender and its related concept: gender equality, gender equity (group work).
- Discuss different types of disabilities (physical, mental, intellectual or sensory impairment).
- Discuss the activities sensitive to the cultural diversity, disabilities and gender neutrality at the workplace.
- Demonstrate acceptable interpersonal transactions with individuals having disabilities (physical, mental, intellectual or sensory impairment) or cultural diversity.
- Discuss the basic rules and regulations related to gender sensitivity, disabilities, and cultural diversity, with their impact on operations of a workplace.
- Demonstrate the process modifications required to make the workplace free from gender biases.
- Discuss how to take initiative in resolving issues among co-workers in a given situation.
- Discuss reporting procedure followed at the workplace.

UNIT 7.1: Effective Communication and Teamwork

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Elucidate own roles and responsibilities.
- Explain the importance of effective communication.
- Explain different modes of communication used at the workplace.
- Elucidate the consequence of poor teamwork on project outcomes, timelines, safety at the construction site, etc.
- Demonstrate how to pass on work-related information/requirements clearly to the team members.
- Show how to report any unresolved problem to the supervisor immediately.

Resources to be Used

- Theory
    - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts

Do

- Explain own roles and responsibilities.
- Explain the importance of effective communication.
- Explain different modes of communication used at the workplace.
- Explain the consequence of poor teamwork on project outcomes, timelines, safety at the construction site, etc.
- Demonstrate how to pass on work-related information/requirements clearly to the team members.
- Demonstrate how to report any unresolved problem to the supervisor immediately.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 7.1 to explain Effective Communication and Teamwork.
- Understanding one's roles and responsibilities is crucial in the construction industry, especially for bar benders and steel fixers. This includes knowing the specific tasks, following safety protocols, and collaborating effectively with the team. It ensures that the work is completed accurately and safely.
    - Tips: Keep a written list of your daily tasks, seek clarification from supervisors if unsure, and proactively offer assistance when needed.
- Effective communication is vital in construction to prevent errors, enhance safety, and ensure tasks are completed on time. Bar benders and steel fixers must convey information clearly to avoid misunderstandings and maintain a safe working environment.
    - Tips: Listen actively, ask questions for clarification, and use clear and concise language when communicating with team members.
- In the construction industry, communication can take various forms, including verbal, written (emails, reports), visual (diagrams, drawings), and non-verbal (body language). Bar benders and steel fixers should

be proficient in using these modes to convey information effectively.

- Tips: Adapt your communication style to the situation, use visual aids when necessary, and be aware of non-verbal cues.

- Poor teamwork can lead to errors, delays, and compromised safety on construction sites. Bar benders and steel fixers must understand that their actions directly impact the project's success, timeline, and safety.
  - Tips: Foster a collaborative mindset, communicate openly with team members, and seek solutions to challenges together.
- Clear communication of work-related information is essential. Bar benders and steel fixers should learn to convey instructions, specifications, and safety guidelines to their team members accurately.
  - Tips: Use simple and straightforward language, provide context when necessary, and confirm that the message is understood.
- If a problem arises that you cannot resolve independently, it's crucial to report it to your supervisor promptly. Delayed reporting can lead to more significant issues down the line.
  - Tips: Clearly describe the problem, its impact, and any steps you've taken to address it. Be proactive in seeking assistance from your supervisor.

Activity 7.1.1

Name: "Effective Communication Workshop"

Purpose: This activity aims to enhance the learners' understanding of the importance of effective communication, the various modes of communication in the workplace, the impact of poor teamwork, and practical communication skills. It also encourages them to report issues promptly.

Resources Required:

- Whiteboard and markers
- Flipcharts and sticky notes
- Projector and screen (optional)
- Scenario cards (pre-written workplace scenarios)
- Notepads and pens
- Supervisor or facilitator

Tentative Duration: 2 hours

Procedure:

1. Introduction (15 minutes):
   - Begin with a brief introduction to the importance of effective communication in construction work.
   - Highlight the consequences of poor teamwork and communication on project outcomes, timelines, and safety.
2. Modes of Communication (20 minutes):
   - Discuss different modes of communication used at the workplace, including verbal, written, visual, and non-verbal communication.
   - Use examples to illustrate when each mode is most appropriate.
3. Interactive Scenarios (30 minutes):
   - Divide learners into small groups.
   - Provide scenario cards describing workplace situations involving communication challenges or teamwork issues.

- Each group discusses how they would address the scenario and improve communication/teamwork.
- Groups present their solutions to the whole class.

4. Demonstration (15 minutes):
    - The facilitator demonstrates how to pass on work-related information clearly to team members using effective communication techniques.
    - Learners can observe and ask questions.
5. Role-Playing Activity (30 minutes):
    - Each group is given a different communication challenge scenario.
    - They role-play the scenario, focusing on effective communication and teamwork.
    - After each role-play, the facilitator and peers provide feedback.
6. Reporting Issues (15 minutes):
    - Discuss the importance of reporting issues to supervisors promptly.
    - Explain the reporting process in the workplace.
    - Encourage learners to ask questions and clarify doubts.
7. Q&A and Discussion (15 minutes):
    - Open the floor for questions and discussions.
    - Address any queries or concerns related to communication and teamwork.

Expected Outcome: Learners will have a deeper understanding of effective communication, various communication modes, teamwork, and the significance of reporting issues promptly. They will also acquire practical communication skills to apply in their work.

Notes

UNIT 7.2: Working Effectively and Maintaining Discipline at Work

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Explain the importance of creating healthy and cooperative work environment among the gangs of workers.
- Elucidate applicable techniques of work, properties of materials used, tools and tackles used, safety standards that co-workers might need as per the requirement.
- Explain the importance of proper and effective communication and the expected adverse effects in case of failure relating to quality, timeliness, safety, risks at the construction project site.
- Explain the importance and need of supporting co-workers facing problems for the smooth functioning of work.
- Demonstrate ways to hand over the required material, tools, tackles, equipment and work fronts timely to interfacing teams.
- Demonstrate ways to work together with co-workers in a synchronized manner.

Resources to be Used

- Theory
    - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts

Do

- Explain the importance of creating healthy and cooperative work environment among the gangs of workers.
- Explain applicable techniques of work, properties of materials used, tools and tackles used, safety standards that co-workers might need as per the requirement.
- Explain the importance of proper and effective communication and the expected adverse effects in case of failure relating to quality, timeliness, safety, risks at the construction project site.
- Explain the importance and need of supporting co-workers facing problems for the smooth functioning of work.
- Demonstrate ways to hand over the required material, tools, tackles, equipment and work fronts timely to interfacing teams.
- Demonstrate ways to work together with co-workers in a synchronized manner.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 7.2 to explain Working Effectively and Maintaining Discipline at Work.
- A healthy and cooperative work environment fosters teamwork, improves morale, and enhances productivity. In construction, where tasks are often interdependent, a positive work atmosphere is essential for safety and project success.

  Tips: Encourage open communication, resolve conflicts promptly, and promote a culture of respect among co-workers.

- Understanding the techniques, materials, tools, and safety standards relevant to the job is essential for efficient and safe work. Bar benders and steel fixers should have a solid grasp of these aspects to perform their tasks effectively.
  Tips: Stay updated on industry best practices, attend relevant training sessions, and seek guidance from experienced colleagues.

- Effective communication ensures that tasks are carried out correctly, on time, and safely. Poor communication can lead to mistakes, delays, and even accidents on construction sites.

  Tips: Practice active listening, be clear in your messages, and encourage co-workers to communicate openly.

- Supporting co-workers facing challenges is crucial for maintaining project progress and morale. A construction project's success often hinges on the ability of the team to overcome obstacles together.

  Tips: Offer assistance when you see a co-worker struggling, seek help when needed, and foster a culture of mutual support.

- Efficient handovers are essential to ensure smooth transitions between tasks and teams. Bar benders and steel fixers should know how to pass on materials and information effectively.

  Tips: Clearly communicate what is needed, provide proper documentation, and conduct thorough handover briefings.

- Synchronized teamwork is critical in construction to avoid clashes, improve efficiency, and ensure safety. Bar benders and steel fixers should know how to coordinate their tasks with other trades and workers on the site.

  Tips: Plan tasks together with other teams, establish clear workflows, and communicate any changes promptly to maintain synchronization.

Notes

UNIT 7.3: Maintaining Social Diversity at Work

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Discuss the fundamental concept of gender equality.
- Explain how to recognise and be sensitive to issues of disability culture and gender.
- Discuss legislation, policies, and procedures relating to gender sensitivity and cultural diversity including their impact on the area of operation.
- Demonstrate effective implementation of gender-neutral practices at the workplace.
- Demonstrate ways to address discriminatory and offensive behaviour in a professional manner as per organizational policy.

Resources to be Used

- Theory
    - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts

Do

- Explain the fundamental concept of gender equality.
- Explain how to recognise and be sensitive to issues of disability culture and gender.
- Explain legislation, policies, and procedures relating to gender sensitivity and cultural diversity including their impact on the area of operation.
- Demonstrate effective implementation of gender-neutral practices at the workplace.
- Demonstrate ways to address discriminatory and offensive behaviour in a professional manner as per organizational policy.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 7.3 to explain Maintaining Social Diversity at Work.
- Gender equality is the principle that all individuals, regardless of their gender, should have equal rights, opportunities, and treatment in all aspects of life. It promotes fairness and prevents discrimination based on gender, ensuring that everyone can reach their full potential.
    - Tips: Foster a workplace culture that values diversity, provides equal opportunities, and actively combats gender bias.
- Recognizing and being sensitive to issues related to disability culture and gender requires empathy, education, and a willingness to understand the unique experiences and challenges faced by different individuals. It involves acknowledging diversity and respecting the perspectives of others.
    - Tips: Engage in diversity training, actively listen to others' experiences, and avoid making assumptions about people based on their gender or disability.
- Understanding the legal and organizational frameworks that address gender sensitivity and cultural diversity is essential. It involves being aware of anti-discrimination laws, company policies, and procedures that promote inclusion and fairness.

- Tips: Familiarize yourself with relevant laws and policies, and ensure compliance to create a more inclusive and respectful workplace.

- Implementing gender-neutral practices involves creating an environment where individuals are treated equally regardless of their gender. This includes fair hiring practices, unbiased decision-making, and providing equal opportunities for career growth.
  - Tips: Review hiring and promotion processes for gender bias, promote diversity in leadership roles, and actively address any gender-related issues that arise.
- Addressing discriminatory and offensive behavior is crucial for maintaining a respectful work environment. It involves addressing such behavior promptly, professionally, and in alignment with organizational policies.
  - Tips: Report incidents following company procedures, engage in constructive dialogue with offenders when appropriate, and support colleagues who experience discrimination or offensive behavior.

Exercise:

Key Solutions to PHB Exercise:

Short Questions:

1. How can timely actions positively impact the outcome of a task? Provide an example.
2. What are the key benefits of effective teamwork in accomplishing tasks? Share an illustrative example.
3. Why is proper communication crucial for task success, and what are the consequences of communication failure? Give a real-life scenario.
4. What is the significance of discussing gender equality, gender equity, disabilities, and cultural diversity in a group setting? Explain.
5. How can individuals demonstrate acceptable interpersonal transactions with co-workers who have disabilities or belong to diverse cultural backgrounds? Provide insights.

Fill-in-the-Blanks:

1. Timely actions can prevent project delays and enhance efficiency, leading to _____ outcomes.
    a) favorable
    b) unfavorable
2. Effective teamwork fosters collaboration and diverse perspectives, resulting in improved _____.
    a) decision-making
    b) isolation
3. Proper communication helps avoid misunderstandings, conflicts, and _____ errors.
    a) productivity
    b) communication
4. Initiating discussions on gender sensitivity, disabilities, and cultural diversity promotes a workplace culture of _____.
    a) exclusion
    b) inclusion
5. To promote gender neutrality, workplaces may require process modifications to eliminate gender-related _____.
    a) biases
    b) benefits

True/False Questions:

1. True or False: Timely actions can have a negative impact on task outcomes when rushed or poorly executed.
2. True or False: Effective teamwork often leads to silos and limited perspectives in problem-solving.
3. True or False: Proper communication is mainly essential for written reports and formal documents.
4. True or False: Discussing issues related to gender, disabilities, and cultural diversity is not relevant in a professional setting.
5. True or False: Process modifications to eliminate gender biases are unnecessary in modern workplaces.

Notes

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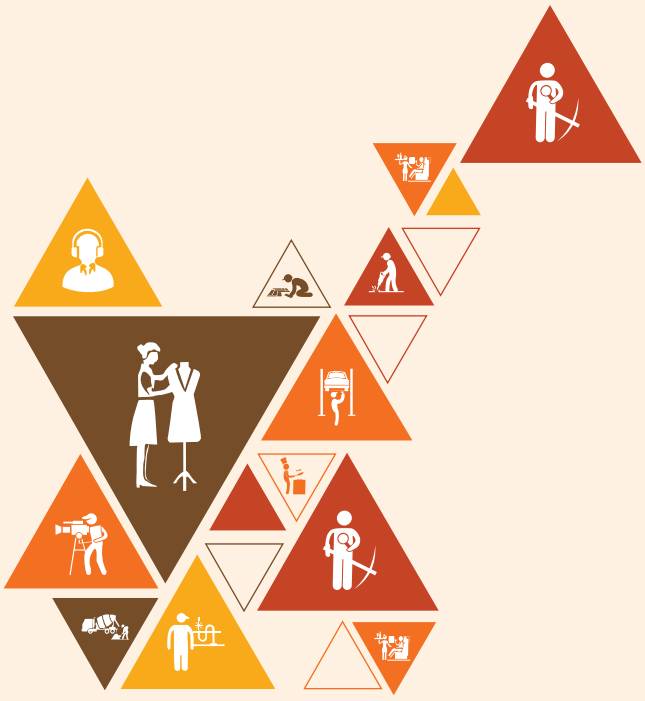
8. Prioritise Activities and Organise Resources

UNIT 8.1: Prioritise Work Activities to Achieve Desired Results

UNIT 8.2: Organising Resources



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Key Learning Outcomes

At the end of this module, you will be able to:

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

UNIT 8.1: Prioritise Work Activities to Achieve Desired Results

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Explain the basic concept of labor productivity and work productivity.
- Identify the work target and plan activities to achieve the desired productivity.
- Explain the process of planning the given tasks and activities relevant to the trade/job role within the defined scope and duration.
- Demonstrate the planning for various activities relevant to the task as per the scope and schedule.
- Explain the work plan and flow of activities in sequence for the assigned work.
- Explain methods to upkeep, store, and stack tools, materials used for domain-specific works.
- Select the required quantity of materials, tools, or devices for defined work activities.
- Explain the procedure adopted for prioritizing an activity and sequencing of activities.
- Demonstrate how to prioritize all works/activities to maximize output.
- Explain requisition of resources, reporting for the requirement of resources orally and in writing to the concerned authority.
- Demonstrate requisition of resources citing an example.

Resources to be Used

- Theory
    - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts

Do

- Explain the basic concept of labor productivity and work productivity.
- Identify the work target and plan activities to achieve the desired productivity.
- Explain the process of planning the given tasks and activities relevant to the trade/job role within the defined scope and duration.
- Demonstrate the planning for various activities relevant to the task as per the scope and schedule.
- Explain the work plan and flow of activities in sequence for the assigned work.
- Explain methods to upkeep, store, and stack tools, materials used for domain-specific works.
- Select the required quantity of materials, tools, or devices for defined work activities.
- Explain the procedure adopted for prioritizing an activity and sequencing of activities.
- Demonstrate how to prioritize all works/activities to maximize output.
- Explain requisition of resources, reporting for the requirement of resources orally and in writing to the concerned authority.
- Demonstrate requisition of resources citing an example.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 8.1 to explain Prioritise Work Activities to Achieve Desired Results.
- Understanding labor productivity involves measuring the output achieved by an individual or team over a specific period. Work productivity encompasses efficiency and resource utilization.
    - Tips: Track tasks completed per hour or day to gauge productivity. Identify bottlenecks and areas for improvement to enhance work productivity.
- Setting clear work targets provides a sense of direction and purpose. Effective planning involves breaking down tasks, allocating resources, and estimating time requirements.
    - Tips: Define SMART (Specific, Measurable, Achievable, Relevant, Time-bound) work targets. Use project management tools to plan tasks and monitor progress.
- Planning tasks within a defined scope and timeframe ensures that work stays on track and aligns with project objectives. It involves creating task lists, setting priorities, and estimating durations.
    - Tips: Break down complex projects into smaller, manageable tasks. Include buffer time for unexpected delays in your planning.
- Practical demonstration of planning showcases the ability to organize work effectively. It includes creating schedules, allocating resources, and outlining dependencies.
    - Tips: Use visual aids like Gantt charts to illustrate task sequences. Involve team members in the planning process to gain diverse insights.
- A well-structured work plan ensures that tasks are completed in the right order, minimizing disruptions. Sequence activities logically to optimize efficiency.
    - Tips: Consider the critical path method to identify tasks that impact project timelines the most. Maintain flexibility to adapt the sequence as needed.
- Proper maintenance and storage of tools and materials enhance productivity by reducing downtime. Organize workspaces to facilitate easy access.
    - Tips: Regularly inspect tools and equipment for wear and tear. Implement a “first in, first out” (FIFO) system for material storage to prevent waste.
- Resource selection involves estimating the quantity of materials, tools, or devices needed for a task. Over- or underestimating can lead to inefficiencies.
    - Tips: Use historical data or consult experts to improve resource estimation accuracy. Keep a buffer of essential resources to handle unexpected demands.
- Effective prioritization ensures that critical tasks are addressed first. Sequencing activities optimally minimizes idle time.
    - Tips: Apply techniques like the Eisenhower Matrix (urgent vs. important) to prioritize tasks. Focus on high-priority items during peak productivity hours.
- Resource requisition involves formally requesting materials, tools, or equipment for a project. Clear and concise communication is essential.
    - Tips: Use written requisitions for critical items to maintain a record. Follow up verbally to ensure timely delivery.
- A practical demonstration of resource requisition showcases effective communication skills and the ability to specify requirements accurately.
    - Tips: Provide detailed information in requisitions, including quantities, specifications, and delivery deadlines. Confirm receipt and condition of resources upon delivery.

Activity 8.1.1

Name: "Productivity Planning Challenge"

Purpose: This activity aims to help learners understand the concepts of labor productivity and work productivity, plan tasks efficiently, and manage resources effectively in their role as bar benders and steel fixers.

Resources Required:

- Whiteboard and markers
- Work target sheets (with different tasks)
- List of tools and materials
- Project schedule (for sequencing)
- Supervisor or facilitator

Tentative Duration: 2 hours

Procedure:

1. Introduction (10 minutes):
    - Begin with an introduction to the importance of productivity in construction work.
    - Explain the difference between labor productivity (individual performance) and work productivity (task efficiency).
2. Task Identification (15 minutes):
    - Provide a list of various construction tasks relevant to bar bending and steel fixing.
    - Ask learners to identify the tasks they commonly perform in their role.
3. Work Target Setting (10 minutes):
    - Distribute work target sheets with different tasks listed.
    - Each learner selects a task and sets a personal work target (e.g., number of reinforcement bars to bend and fix in a specific time).
4. Planning and Sequencing (20 minutes):
    - Discuss the importance of planning and sequencing tasks to achieve productivity.
    - Use the project schedule to demonstrate how tasks are sequenced in real construction projects.
    - Ask learners to plan their selected tasks, considering the sequence and dependencies.
5. Resource Management (15 minutes):
    - Discuss the importance of selecting the right quantity of materials and tools.
    - Provide a list of required tools and materials for each task.
    - Learners select the necessary resources for their planned task.
6. Prioritization and Sequencing Activity (20 minutes):
    - Divide learners into small groups.
    - Provide each group with a set of tasks (e.g., bending, cutting, fixing).
    - Groups must prioritize and sequence the tasks for maximum efficiency.
    - Each group presents its plan to the class.
7. Requisition and Reporting (15 minutes):
    - Explain the process of requisitioning additional resources when needed.
    - Provide an example scenario where a specific tool is required urgently.
    - Learners practice writing a requisition report for the tool.
8. Discussion and Reflection (15 minutes):

- Open the floor for a discussion on productivity planning experiences and challenges.
- Reflect on how effective planning and resource management can improve work performance.

Expected Outcome: Learners will gain a better understanding of labor and work productivity, improve their planning and sequencing skills, and develop the ability to manage resources effectively. They will also learn how to set work targets, prioritize tasks, and requisition resources as needed, contributing to improved productivity in their role as bar benders and steel fixers.

Notes

UNIT 8.2: Organising Resources

Unit Objectives

At the end of this unit, trainer will ensure that participant will be able to:

- Explain how to minimize wastage of resources.
- Demonstrate optimum use of resources while performing domain-specific work activities.
- Demonstrate waste collection and disposal as per organizational norms.
- Explain the plan for waste collection and disposal after the task.
- Demonstrate completion of work within stipulated time and plan.

Resources to be Used

- Theory
    - Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Computer, Registers, and Trade specific charts

Do

- Explain how to minimize wastage of resources.
- Demonstrate optimum use of resources while performing domain-specific work activities.
- Demonstrate waste collection and disposal as per organizational norms.
- Explain the plan for waste collection and disposal after the task.
- Demonstrate completion of work within stipulated time and plan.

Notes for Facilitation

- Use the Bar Bender and Steel Fixer PHB and refer unit 8.2 to explain Organising Resources.
- Minimizing resource wastage involves careful planning, efficient use, and responsible disposal of materials and tools. This not only reduces costs but also has environmental benefits.
    - Tips: Regularly inspect tools and equipment for maintenance needs. Implement recycling and reuse practices when applicable to reduce waste.
- Optimum resource utilization ensures that materials, time, and manpower are used efficiently to achieve project goals. It requires planning, monitoring, and adaptability.
    - Tips: Cross-train team members to handle multiple tasks. Implement lean principles to streamline processes and reduce resource waste.
- Proper waste collection and disposal follow regulations and guidelines to ensure safety and environmental compliance. It includes segregating, collecting, and disposing of waste appropriately.
    - Tips: Educate workers on waste segregation practices. Maintain designated waste collection areas and provide necessary equipment for safe disposal.
- Effective planning includes scheduling waste collection, allocating resources for disposal, and ensuring adherence to legal requirements. It helps maintain a clean and safe work environment.
    - Tips: Create a waste management plan that outlines responsibilities and procedures. Regularly review and update the plan as needed.

- Timely completion of work activities is crucial to project success. It requires adherence to schedules, efficient task execution, and proactive problem-solving.
    - Tips: Use project management software to track progress and identify potential delays. Encourage open communication within the team to address challenges promptly.

Exercise:

Key Solutions to PHB Exercise:

Short Questions:

1. Efficient upkeep of tools and materials on a construction site can be ensured by implementing regular maintenance, proper storage, and careful handling. It's also important to train workers on tool maintenance.
2. The primary purpose of a project plan in the construction industry is to outline the project's scope, objectives, timeline, resource allocation, and tasks required for successful project completion.
3. Sequencing of activities is important in project planning because it determines the order in which tasks should be executed. This helps in optimizing resources, avoiding bottlenecks, and meeting project deadlines.
4. To organize the required resources for an assigned task, one should follow steps like identifying resource needs, requisitioning resources, allocating resources to tasks, and monitoring their usage throughout the project.
5. Selecting the right quantity of materials contributes to project efficiency by preventing waste, reducing costs, and ensuring that construction proceeds smoothly without interruptions.

Fill in the Blanks:

1. Proper storage helps extend the lifespan of tools and materials.
2. The critical path method helps identify the longest sequence of activities.
3. Selecting the optimal quantity of materials helps prevent waste and ensures the project stays on budget.
4. Organizing resources is a one-time activity and does not require adjustments as the project progresses. It is a false statement.
5. Planning activities based on the schedule is more important than considering their complexity.

True/False Questions:

1. False: Prioritizing activities is essential in project planning.
2. False: Selecting the right quantity of materials has a significant impact on project cost.
3. True: Proper resource organization has a substantial influence on construction site safety.
4. False: The critical path is not necessarily the shortest path to complete a project; it's the longest path in terms of project duration.
5. False: Requisition of resources is necessary to ensure resources are available when needed, not just in case of shortages.

Notes

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सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
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Transforming the skill landscape

Construction Skill Development Council

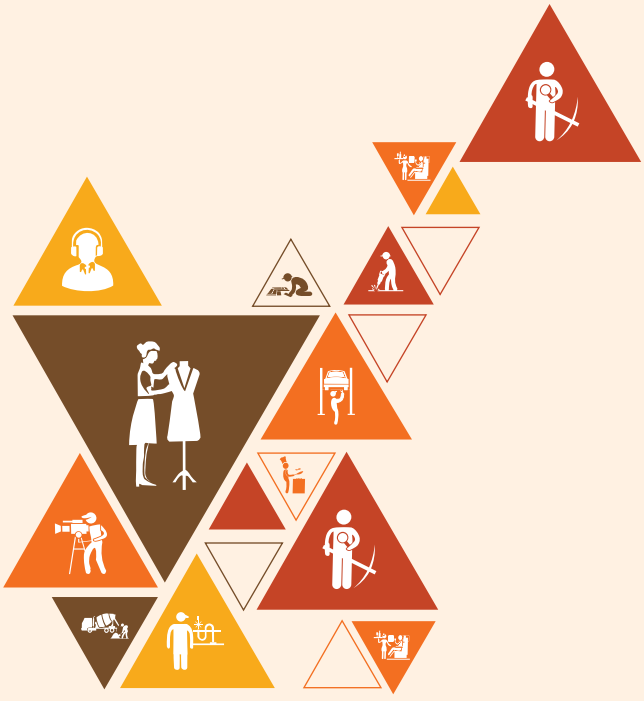
9. Maintaining a Safe, Hygienic and Secure Working Environment

Unit 9.1 - Hazards and Emergency Situations

Unit 9.2 - Safety Drills, PPEs and Fire Safety

Unit 9.3 - Hygiene and Safe Waste Disposal Practices

Unit 9.4 - Infectious Disease and Its Cure



(CON/N9001)

Key Learning Outcomes

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

Unit 9.1 - Hazards and Emergency Situation

Objectives:

At the end of this unit, trainer will ensure that participant will be able to:

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

Topic Introduction

- Give the participants a brief overview of this unit
- Applications in various job environment

Resources to be Used

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

Do

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

Notes for Facilitation

- Use the Bar Bender & Steel Fixer PHB and refer unit 9.1 to explain Hazards and Emergency Situations.
- Types of Hazards at Construction Sites (Including Domain-Related Hazards for Bar Bender & Steel Fixers): Construction sites present various hazards, including but not limited to:
  - Physical Hazards: Falling objects, machinery, excavation risks.
  - Chemical Hazards: Exposure to hazardous substances, chemicals, or gases.
  - Biological Hazards: Exposure to infectious agents, mold, or bacteria.
  - Ergonomic Hazards: Strain from lifting, repetitive motions, or awkward postures.
  - Electrical Hazards: Contact with live wires or faulty electrical equipment.
  - Fire and Explosion Hazards: Flammable materials, faulty wiring, combustible gases.
- Domain-Related Hazards for Bar Bender & Steel Fixers might include:

- Falling Hazards: Working at heights without proper fall protection.
- Manual Handling Hazards: Lifting heavy materials improperly.
- Hazardous Substances: Exposure to cement dust, chemicals in mortar, etc.
- Tool and Equipment Hazards: Misuse of tools, lack of proper maintenance.

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

Say:

Let's engage in a practical activity focused on the reporting procedures that a Bar Bender & Steel Fixer should follow during emergency situations. This activity underscores the importance of effective communication and coordination to ensure the safety and well-being of all individuals on the construction site.

Activity: Reporting Emergency Situations for Bar Bender & Steel Fixers

- Purpose: This activity aims to provide Bar Bender & Steel Fixers with hands-on experience in understanding and practicing the reporting procedures essential for effective emergency response.
- Resources Required: Scenario cards describing emergency situations, writing materials.
- Tentative Duration: 45 Minutes
- Procedure:
  - Introduction: Begin by emphasizing the significance of prompt and accurate reporting during emergencies to maintain a safe work environment.
  - Scenario Distribution: Distribute scenario cards, each depicting a unique emergency situation, to participants.
  - Internal Communication Role Play:
    - Form pairs among participants.

- Assign roles in each pair: one as the Bar Bender & Steel Fixer and the other as the supervisor or project manager.
- Bar Bender & Steel Fixers practice communicating the emergency to their supervisor using the established reporting procedures.

- Discussion on Established Protocol:
  - Gather participants for a discussion about the organization's established protocol for reporting emergencies.
  - Emphasize the significance of adhering to these protocols for an organized response.
- Documentation Practice:
  - Participants individually document the specifics of the emergency scenario assigned to them.
  - They note down the time, location, incident nature, and any injuries if applicable.
- Cooperation with Authorities Exercise:
  - Present a scenario involving cooperation with emergency responders.
  - Participants engage in role-play, providing accurate information and following instructions from the responders.
- Group Discussion and Sharing:
  - Participants share their experiences and insights from the role-playing exercises.
  - Facilitate a discussion on challenges faced and best practices for reporting emergencies.
- Reflection and Conclusion:
  - Engage participants in reflecting on the significance of precise reporting for maintaining safety during emergencies.
  - Summarize the key learnings and underscore the importance of following reporting procedures.

Expected Outcome: Through this activity, Bar Bender & Steel Fixers will gain practical familiarity with reporting procedures during emergency situations. They will comprehend the importance of effective communication, documentation, and cooperation with authorities to ensure the safety and well-being of themselves and their colleagues on the construction site.

Notes

Unit 9.2 - Safety Drills, PPEs and Fire Safety

Objectives:

At the end of this unit, trainer will ensure that participant will be able to:

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

Topic Introduction

- Give the participants a brief overview of this unit
- Applications in various job environment

Resources to be Used

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

Do

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

Notes for Facilitation

- Use the Bar Bender & Steel Fixer PHB and refer unit 9.2 to explain Safety Drills, PPEs and Fire Safety.

- Classes of Fire: Fires are classified into different classes based on the type of fuel involved:
    - Class A: Fires involving common combustible materials like wood, paper, and cloth.
    - Class B: Fires involving flammable liquids, gases, or greases.
    - Class C: Fires involving energized electrical equipment.
    - Class D: Fires involving combustible metals.
    - Class K: Fires involving cooking oils and fats, commonly found in kitchens.
- Types of Fire Extinguishers: Different types of fire extinguishers are designed to handle specific classes of fire:
    - Water Extinguishers (Class A): Suitable for Class A fires, but not for fires involving flammable liquids or electrical equipment.
    - Foam Extinguishers (Class A and B): Effective on Class A and B fires, but not for electrical fires.
    - Dry Powder Extinguishers (Class A, B, C, and D): Suitable for a range of fires, including electrical fires and flammable liquids.
    - CO2 Extinguishers (Class B and Electrical Fires): Effective for flammable liquid and electrical fires, but not for Class A fires.
    - Wet Chemical Extinguishers (Class K): Specifically designed for kitchen fires involving cooking oils and fats.
- Operating Procedure of Fire Extinguishers:
    - Pull: Pull the pin to break the seal and unlock the operating lever.
    - Aim: Aim the nozzle at the base of the fire where the fuel source is.
    - Squeeze: Squeeze the operating lever to release the extinguishing agent.
    - Sweep: Sweep the nozzle from side to side while directing the agent at the base of the fire until it's extinguished.
- Importance of Participation in Safety Drills: Participation in safety drills is important for several reasons:
    - Familiarity: Workers become familiar with evacuation routes and emergency procedures.
    - Response Practice: Workers practice how to respond to emergencies, minimizing confusion during real incidents.
    - Efficiency: Regular drills improve the efficiency of evacuation and emergency response.
    - Identification of Weaknesses: Drills help identify areas that need improvement in the emergency plan.
- Basic Medical Tests Required for Construction Site: Common medical tests for construction site workers include:
    - Physical Examination: Overall health assessment.
    - Vision and Hearing Tests: Ensuring good visual and auditory health.
    - Lung Function Test: Assessing respiratory health.
    - Blood Pressure and Heart Rate Check: Monitoring cardiovascular health.
- Purpose and Importance of Vertigo Test: A vertigo test assesses a worker's balance and susceptibility to dizziness, which is crucial for working at heights. Vertigo can lead to accidents and falls, making this test vital for maintaining site safety.
- Types and Benefits of Basic Ergonomic Principles: Ergonomic principles for construction tasks include proper lifting techniques, maintaining neutral body positions, and using suitable tools. Benefits include reducing strain, preventing musculoskeletal injuries, and enhancing overall worker well-being.
- Demonstrating Use of PPEs: Proper PPE usage involves:
    - Selection: Choose the appropriate PPE for the task.
    - Fitting: Ensure PPE fits correctly and comfortably.

- Wearing: Wear PPE consistently throughout the task.
- Adjusting: Make necessary adjustments for comfort and effectiveness.
- Maintaining: Regularly inspect and maintain PPE to ensure it functions properly.

- Using PPE correctly safeguards workers from potential hazards like head injuries, respiratory issues, and more, contributing to a safer work environment for Bar Bender & Steel Fixer.

Activity - 1

General Safety at a Construction Site

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

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

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

Table 9.2.1 – General safety at a construction site

Specific Instructions

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

Activity - 2

Working at Heights

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

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

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

Table 9.2.2 – Working at heights

Specific Instructions

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

Notes

Unit 9.3 - Hygiene and Safe Waste Disposal Practices

Objectives:

At the end of this unit, trainer will ensure that participant will be able to:

- Follow the practices to maintain personal hygiene, workplace hygiene and site/ workplace sanitization
- Understand the importance of housekeeping works
- Keep an eye on safe housekeeping practices
- Understand different types of waste at construction sites and their disposal method
- Know safe waste disposal practices followed at construction site

Topic Introduction

- Give the participants a brief overview of this unit
- Applications in various job environment

Resources to be Used

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

Do

- Explain the practices to maintain personal hygiene, workplace hygiene and site/ workplace sanitization
- Describe the importance of housekeeping works
- Discuss the safe housekeeping practices and ask them to follow
- Explain different types of waste at construction sites and their disposal method
- Explain safe waste disposal practices followed at construction site

Notes for Facilitation

- Use the Bar Bender & Steel Fixer PHB and refer unit 9.3 to explain Hygiene and Safe Waste Disposal Practices.
- Personal Hygiene: Maintaining personal hygiene involves practices such as washing hands before and after work, wearing clean and appropriate clothing, and using personal protective equipment (PPE) to prevent contamination and protect oneself from hazards.
- Workplace Hygiene: Workplace hygiene includes keeping work areas clean, organized, and free from hazards. Regular cleaning of tools, equipment, and surfaces helps prevent accidents, maintain efficiency, and promote a healthy work environment.

- Site Sanitization: Site sanitization involves cleaning and disinfecting shared areas to prevent the spread of germs and ensure a safe working environment. This is especially important in light of health concerns and global events.
- Importance of Housekeeping Works: Housekeeping works are crucial in the construction industry for several reasons:
    - Safety: A clean and organized workspace reduces the risk of slips, trips, falls, and other accidents.
    - Efficiency: Proper organization of tools, materials, and equipment improves work efficiency.
    - Prevention: Regular cleaning prevents the buildup of dust, debris, and potential fire hazards.
    - Morale: A clean and organized work environment boosts worker morale and job satisfaction.
- Safe Housekeeping Practices:
    - Daily Clean-up: Clean-up work areas at the end of each day to ensure a fresh start the next day.
    - Tool Storage: Properly store tools, equipment, and materials after use to prevent tripping hazards and damage.
    - Waste Disposal: Dispose of waste properly and promptly to prevent clutter and hygiene issues.
- Different Types of Waste at Construction Sites and Their Disposal:
    - General Waste: Regular construction debris like paper, packaging, and non-hazardous materials.
    - Hazardous Waste: Includes chemicals, solvents, paints, and materials that pose health or environmental risks.
    - Electronic Waste: Old or broken electronic equipment, requiring proper disposal due to environmental concerns.
- Safe Waste Disposal Practices at Construction Site:
    - Separation: Segregate waste into different categories for appropriate disposal.
    - Labelling: Clearly label hazardous waste containers to prevent accidents.
    - Storage: Store waste in designated areas to avoid contamination and health hazards.
    - Legal Compliance: Follow local regulations and guidelines for waste disposal.
- Maintaining personal and workplace hygiene, implementing proper housekeeping practices, and ensuring safe waste disposal contribute to a safer and more organized construction site environment, benefitting both workers and the overall project.

Activity - 1

Safe Disposal of Waste

Conduct a role play activity.

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

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

Table 9.3.1 – Safe disposal of waste

Specific Instructions

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

Notes

Unit 9.4 - Infectious Disease and Its Cure

Objectives:

At the end of this unit, trainer will ensure that participant will be able to:

- Know different types of infectious disease that can spread/ originate at a construction site
- Understand the ways of transmission of the various infectious disease.
- Recognize the methods to check the spread of the infectious disease.
- Understand the symptoms and cure of the various infectious disease.
- Apprehend the procedure to report to the concerned authority regarding the outbreak/ hazard of any infectious disease/ pandemic.

Topic Introduction

- Give the participants a brief overview of this unit
- Applications in various job environment

Resources to be Used

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

Do

- Clarify different types of infectious disease that can spread/ originate at a construction site
- Explain the ways of transmission of the various infectious disease.
- Mention the methods to check the spread of the infectious disease.
- Explain the symptoms and cure of the various infectious disease.
- Apprehend the procedure to report to the concerned authority regarding the outbreak/ hazard of any infectious disease/ pandemic.

Notes for Facilitation

- Use the Bar Bender & Steel Fixer PHB and refer unit 9.4 to explain Infectious Disease and Its Cure.
- Infectious diseases that can spread or originate at construction sites include:
  - Respiratory Infections: Such as the flu, common cold, and COVID-19.
  - Skin Infections: Like bacterial infections, fungal infections, and rashes.
  - Gastrointestinal Infections: Including foodborne illnesses due to poor hygiene.
  - Vector-Borne Diseases: Like mosquito-borne diseases (e.g., Zika, dengue) due to stagnant water.

- Ways of Transmission of Infectious Diseases:
    - Airborne Transmission: Respiratory infections can spread through respiratory droplets released when an infected person coughs, sneezes, or talks.
    - Direct Contact: Skin infections can be transmitted through direct skin-to-skin contact or contact with contaminated surfaces.
    - Fecal-Oral Route: Gastrointestinal infections can spread through contaminated food, water, or surfaces.
    - Vector-Borne Transmission: Insects like mosquitoes can carry and transmit diseases from person to person.
- Methods to Check the Spread of Infectious Diseases:
    - Hand Hygiene: Regularly washing hands with soap and water or using hand sanitizers.
    - Respiratory Hygiene: Covering mouth and nose when coughing or sneezing.
    - Personal Protective Equipment (PPE): Wearing appropriate PPE like masks and gloves.
    - Disinfection: Regularly cleaning and disinfecting surfaces and shared equipment.
- Understanding Symptoms and Cure of Infectious Diseases:
    - Respiratory Infections: Symptoms include fever, cough, sore throat, and shortness of breath. Treatment includes rest, fluids, and in severe cases, medical attention.
    - Skin Infections: Symptoms include redness, swelling, itching, and rashes. Treatment depends on the type of infection and may involve antibiotics or antifungal medications.
    - Gastrointestinal Infections: Symptoms include nausea, vomiting, diarrhea, and abdominal pain. Treatment involves staying hydrated and in severe cases, medical intervention.
    - Vector-Borne Diseases: Symptoms vary based on the disease. Treatment ranges from supportive care to specific antiviral or antibiotic medications.
- Reporting Infectious Disease Outbreaks to Concerned Authorities:
    - Immediate Reporting: If an infectious disease outbreak is suspected, immediately inform your supervisor, manager, or the designated health and safety personnel.
    - Follow Protocols: Follow the organization's protocols for reporting infectious diseases or pandemics, including informing co-workers who may have been exposed.
    - Health Authorities: If necessary, local health authorities should be contacted to ensure proper containment and response.
- Understanding, preventing, and reporting infectious diseases is crucial to maintaining a healthy and safe working environment in the Masonry industry. It protects both workers and the community from potential health risks.

Say:

Let's participate in a practical activity focused on the reporting procedures that a Bar Bender & Steel Fixer should follow in the event of an infectious disease outbreak. This activity highlights the critical importance of swift and accurate reporting to maintain the health and safety of everyone on the construction site.

Activity: Reporting Infectious Disease Outbreaks for Bar Bender & Steel Fixers

- Purpose: This activity aims to provide Bar Bender & Steel Fixers with hands-on experience in understanding and practicing the reporting procedures necessary for responding effectively to infectious disease outbreaks.
- Resources Required: Scenario cards depicting infectious disease outbreak situations, writing materials.
- Tentative Duration: 45 Minutes

- Procedure:
    - Introduction: Begin by discussing the vital role of immediate and accurate reporting during infectious disease outbreaks to safeguard the health of all individuals on the construction site.
    - Scenario Distribution: Distribute scenario cards, each portraying a distinct infectious disease outbreak situation, to participants.
    - Immediate Reporting Role Play:
        - Form pairs among participants.
        - Assign roles: one participant as the Bar Bender & Steel Fixer and the other as the supervisor or health and safety personnel.
        - Bar Bender & Steel Fixers practice promptly informing their supervisor or designated personnel about the infectious disease outbreak in their assigned scenario.
    - Discussion on Protocol Adherence:
        - Gather participants for a discussion about the organization's protocols for reporting infectious diseases or pandemics.
        - Emphasize the importance of following these protocols for effective containment.
    - Health Authorities Interaction Exercise:
        - Present a scenario requiring interaction with local health authorities.
        - Participants engage in role-play, contacting health authorities if necessary to ensure proper response and containment measures.
    - Group Discussion and Sharing:
        - Participants share their experiences and insights from the role-playing exercises.
        - Facilitate a discussion on challenges faced and the significance of accurate reporting during infectious disease outbreaks.
    - Reflection and Conclusion:
        - Engage participants in reflecting on the critical role of reporting procedures in safeguarding the health of the construction site community.
        - Summarize the key takeaways and underline the importance of swift reporting and following established protocols.

Expected Outcome: Through this activity, Bar Bender & Steel Fixers will gain practical understanding of reporting infectious disease outbreaks. They will recognize the significance of immediate reporting, protocol adherence, and cooperation with health authorities in ensuring the safety and health of themselves and their colleagues on the construction site.

Exercise:

Key Solutions to PHB Exercise

A. Short Questions' Answer:

1) Reporting procedures for breaches or hazards at the construction site involve notifying supervisors or management immediately as per established guidelines.
2) Common safety hazards at construction sites include falls, electrical hazards, confined spaces, struck-by or caught-in-between incidents, and chemical exposure.
3) Demonstrating emergency and evacuation procedures involves knowing evacuation routes, using fire alarms, assisting injured individuals, and assembling at designated safe areas.
4) Basic ergonomic principles focus on designing workspaces and tasks to fit the worker's abilities, reducing strain and discomfort during construction activities.
5) In response to accidents and emergencies, steps include assessing the situation, providing first aid if necessary, notifying supervisors, securing the area, and cooperating with emergency responders.

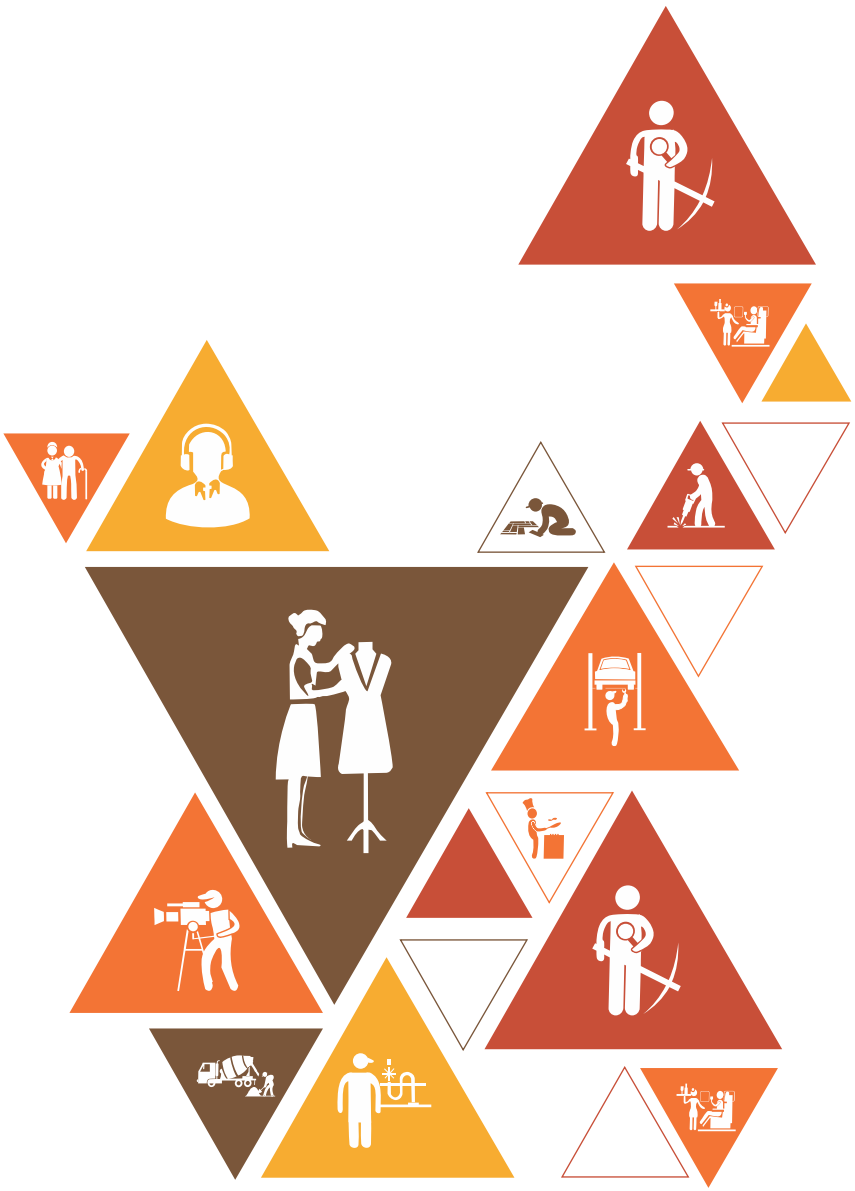
B. Fill-in-the-Blanks Questions' Answer:

1) Proper handling of tools, equipment, and materials is essential as per applicable norms.
2) Different types of fire extinguishers correspond to various types of fires.
3) Using hazardous materials safely involves following standard guidelines.
4) Proper disposal methods are important to manage construction waste.
5) Personal Protective Equipment (PPE) includes items like head protection, ear protection, and fall protection.

C. True/False Questions' Answer:

1) Accidents and hazards don't need to be reported if they result in minor injuries. (False)
2) Ergonomic principles focus on optimizing workspaces and equipment for worker comfort and safety. (True)
3) All types of fire extinguishers can be used interchangeably on different types of fires. (False)
4) Using Personal Protective Equipment (PPE) is not necessary if you're experienced in construction work. (False)
5) Proper cleaning and disinfection of materials, tools, and supplies is not important in construction work. (False)

Notes



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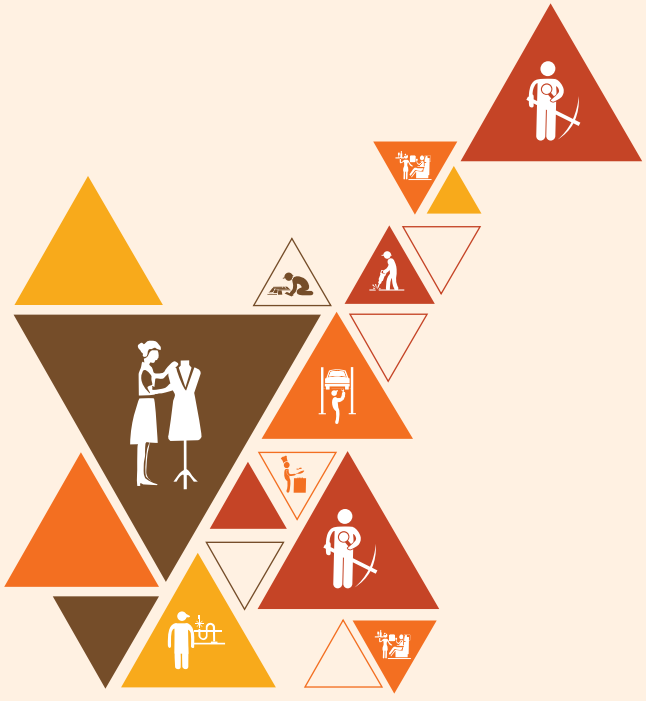
13. Employability Skills (60 Hours)

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



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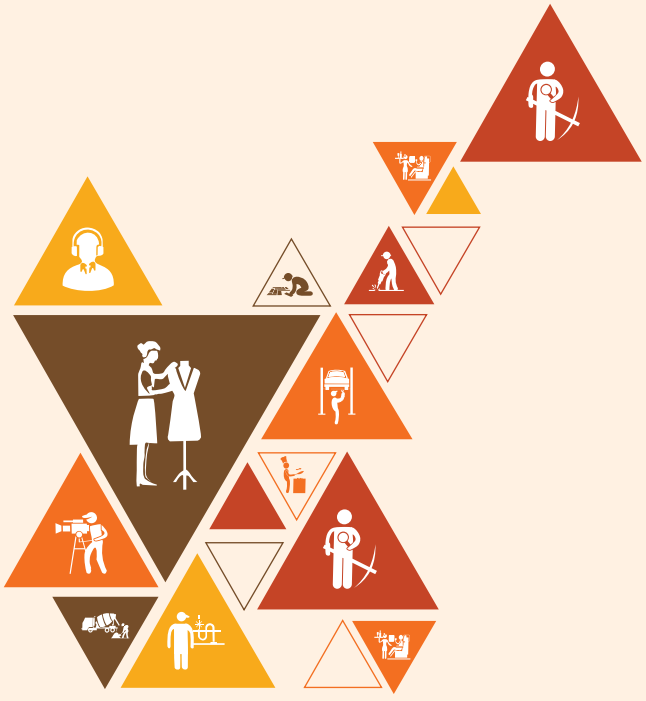
Annexures

Annexure I - Training Delivery Plan

Annexure II - Assessment Criteria

Annexure III- QR Codes –Video Links



Annexure – 1

Training Delivery Plan

Training Delivery Plan			
Program Name:	Bar Bender and Steel Fixer		
Qualification Pack Name & Ref. ID	Bar Bender and Steel Fixer, CON/Q0203		
Version No.	3	**Version Update Date**	31/03/2022
Pre-requisites to Training (if any)	11th grade pass OR Completed 1st year of 3-year diploma (after 10th) and pursuing regular diploma OR 10th grade pass plus 1-year NTC/ NAC OR 8th grade pass plus 2-year NTC plus 1 Year NAC (relevant experience) OR 10th grade pass with 2 Years of experience relevant experience OR Previous relevant Qualification of NSQF Level 3.0 with minimum education as 5th Grade pass OR Previous relevant Qualification of NSQF Level 3.5		
Training Outcomes	**By the end of this program, the participants will be able to:**		
	1. Read and understand routine drawings / sketches and Bar Bending Schedule (BBS)		
	2. Use hand and power tools for cutting and bending of reinforcement bars		
	3. Prepare, fabricate, place and fix reinforcement bars for RCC structures		
	4. Work effectively in a team to deliver desired results at the workplace		
	5. This unit describes the knowledge and the skills required for an individual to plan and organize own work in order to meet expected outcome		
	6. Work according to personal health, safety and environment protocols at construction site		
	7. Employability Skills (60 Hours)		

Sl. No.	Module	Unit	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools / Aids	Duration (hours)
1	Introduction of Construction Sector and Job Role T- 10:00 (HH: MM)	Unit 1.1 – Construction Industry in India	1. Overview of Construction Industry	• Understand the size and scope of the construction industry and its sub-sectors	Bridge Module	Classroom lecture, games, group participation, group activity	Training Kit – Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films	T- 02:00
		Unit 1.2 – About Bar Bending & Steel Fixing Occupation	2. Duties of a Bar Bender and Steel Fixer	Understand the role and responsibilities of a bar bender and steel fixer	Bridge Module	Classroom lecture, games, group participation, group activity	Training Kit – Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films	T- 04:00
			3. About Bar Bending & Steel Fixing Occupation	Recall the basic terms used in bar bending occupation	Bridge Module	Classroom lecture, games, group participation, group activity	Training Kit – Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films	T- 02:00
			4. Career Progression options for Bar Bender and Steel Fixer	Explain the career progression options of a Bar bender and steel fixer	Bridge Module	Classroom lecture, games, group participation, group activity	Training Kit – Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films	T- 02:00
2	Core/ Generic Skills T- 06:00 (HH: MM)	Unit 2.1 – Unit Conversion and Measurement	1. Metric and Imperial Conversion Mastery	To enable learners to confidently convert between metric and imperial measurement systems, ensuring accuracy in construction-related tasks.	Bridge Module	Classroom lecture, games, group participation, group activity	Training Kit – Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Measurement tape	T- 02:00

		Unit 2.2 – Basic Geometrical Shapes and its Properties	Exploring Geometric Shapes in Construction	To familiarize learners with basic geometric shapes commonly encountered in construction and their properties, aiding in precise measurements and layout.	Bridge Module	Classroom lecture, games, group participation, group activity	Training Kit – Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Measurement tape	T- 02:00
		Unit 2.3 – Pythagoras Theorem and its Application	Pythagorean Theorem in Practice	To teach learners how to apply the Pythagorean Theorem in real-world scenarios, particularly in construction, for accurate calculations involving right triangles.	Bridge Module	Classroom lecture, games, group participation, group activity	Training Kit – Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Measurement tape	T- 01:00
		Unit 2.4 – Basic Trigonometry	Fundamentals of Construction Trigonometry	To introduce learners to the basics of trigonometry and its applications in solving construction-related problems, including measurements, angles, and structural stability.	Bridge Module	Classroom lecture, games, group participation, group activity	Training Kit – Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films, Measurement tape	T- 01:00
3	Read Drawings / Sketches and Bar Bending Schedule (BBS) (CON/ N0204) T- 08:00 P- 27:00 (HH: MM)	Unit 3.1 – Bar Bending Drawings	Reinforcement Drawing Interpretation	To train learners in effectively deciphering reinforcement drawings, identifying critical details such as bar type and size, cover requirements, spacing, and chair specifications.	CON/ N0204; PC1, PC3, PC4, KU3, KU9, KU12, GS2, GS4, GS6	Classroom lecture, games, group participation, group activity	Drawings of various types of structures and structural elements, Bar bending schedule sample, Model room	T- 01:00 P- 03:00

			Reinforcement Materials and Measurements	To provide an understanding of the various grades and diameters of reinforcement bars and binding wires used in construction, and equip learners with the skills to convert measurements between metric and imperial units for bar bending and steel fixing.	CON/ N0204, PC6, KU4, KU7, KU8, KU10, GS1, GS3, GS6	Classroom lecture, games, group participation, group activity	Drawings of various types of structures and structural elements, Bar bending schedule sample, Model room	T- 01:00 P- 03:00
			R.C.C Structure Reinforcement Techniques	To guide learners in comprehending the insertion and fixing sequence for different types of R.C.C structures, ensuring they can apply this knowledge to slab, beam, column, footing, wall, and staircase construction.	CON/ N0204, PC2, PC7, KU1, KU5, KU11, GS6, GS8	Classroom lecture, games, group participation, group activity	Drawings of various types of structures and structural elements, Bar bending schedule sample, Model room	T- 01:00 P- 03:00
			Optimizing Reinforcement Efficiency	To explore methods for minimizing the wastage of reinforcement steel, emphasizing resource efficiency and cost-effectiveness in construction practices.	CON/ N0204, PC5, KU2, KU6 GS1, GS5, GS6, GS10	Classroom lecture, games, group participation, group activity	Drawings of various types of structures and structural elements, Bar bending schedule sample, Model room	T- 01:00 P- 03:00

		Unit 3.2 – Bar Bending Schedule (BBS)	Bar and Spacer Calculation	To teach learners how to accurately calculate the number of reinforcement bars, chairs, and spacers required based on drawings and bar bending schedules, ensuring optimal resource planning for construction projects.	CON/ N0204; PC1, PC4, KU2, KU3, KU6, KU7, KU9, KU10, KU12, GS1, GS4, GS6	Classroom lecture, games, group participation, group activity	Drawings of various types of structures and structural elements, Bar bending schedule sample, Model room	T- 01:00 P- 03:00
			Cutting Length Calculation and BBS Interpretation	To enable learners to calculate the cutting length for various shapes of reinforcement bars, such as L-shape and U-shape, using sketches, drawings, and bar bending schedules. Additionally, they will learn to interpret bar bending schedules to confirm critical details within a set timeframe.	CON/ N0204; PC6, PC9, PC10, KU5, KU8, KU10, GS1, GS3, GS6, GS7	Classroom lecture, games, group participation, group activity	Drawings of various types of structures and structural elements, Bar bending schedule sample, Model room	T- 01:00 P- 03:00
			Reinforcement Quantity Estimation	To train learners in interpreting Bar Bending Schedules (BBS) and using this information to estimate the quantity of reinforcement work required for relevant RCC structures, helping them contribute effectively to project planning and execution.	CON/ N0204; PC11, PC12, KU7, KU10, KU11, GS1, GS6, GS9, GS10	Classroom lecture, games, group participation, group activity	Drawings of various types of structures and structural elements, Bar bending schedule sample, Model room	T- 01:00 P- 04:00

4	Using hand and power tools for cutting and bending of reinforcement (CON/N0205) T- 12:00 P- 48:00 (HH:MM)	Unit 4.1 – Reinforcement Bars	Introduction to Reinforcement Bars (Rebars)	To familiarize learners with the basics of reinforcement bars (rebars), their materials, properties, and common uses in construction.	CON/N0205; PC1, PC2, KU1, KU2, GS3, GS6, GS9	Classroom lecture, games, group participation, group activity	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, Threading machine, Reinforcement steel bar, Binding wires, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit	T- 01:00 P- 04:00

			Classification of Reinforcement Bars	To educate learners about the various classifications of reinforcement bars based on materials, strength, and applications in construction.	CON/ N0205; PC1, PC2, KU1, KU2, KU11, KU12, GS3, GS6, GS9	Classroom lecture, games, group participation, group activity	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, Threading machine, Reinforcement steel bar, Binding wires, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit	T- 01:00 P- 04:00

			Calculating Diameter and Unit Weight of Bars	To equip learners with the skills necessary to calculate the diameter and unit weight of reinforcement bars, enabling them to make informed decisions regarding bar selection and quantity estimation in construction projects.	CON/ N0205; PC5, PC6, KU6, KU7, KU8, GS1, GS2, GS3, GS6	Classroom lecture, games, group participation, group activity	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, Threading machine, Reinforcement steel bar, Binding wires, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit	T- 01:00 P- 04:00

		Unit 4.2 – Tools and Machines required	Tools for Reinforcement Bar Work	To introduce learners to the essential hand and power tools used for measuring, marking, cutting, and bending reinforcement bars in construction.	CON/ N0205; PC1, PC3, KU9, KU10, KU20, GS1, GS2, GS3, GS6	Classroom lecture, games, group participation, group activity	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, Threading machine, Reinforcement steel bar, Binding wires, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit	T- 01:00 P- 04:00

			Organizing Tools and Material Resources	To guide learners in effectively arranging and managing the tools and material resources required for efficient reinforcement work on a construction site.	CON/ N0205; PC7, KU3, KU4, KU5, GS1, GS2, GS3, GS6, GS7	Classroom lecture, games, group participation, group activity	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, Threading machine, Reinforcement steel bar, Binding wires, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit	T- 01:00 P- 04:00

			CNC Machines and Electrical Safety	To explain the use of CNC (Computer Numerical Control) machines in reinforcement work and to educate learners on the crucial electrical safety measures to be followed when working with power tools in construction settings.	CON/ N0205; PC8, PC9, PC10, KU13, KU14, KU15, GS1, GS2, GS3, GS4, GS5, GS6, GS10	Classroom lecture, games, group participation, group activity	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, Threading machine, Reinforcement steel bar, Binding wires, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit	T- 01:00 P- 04:00

		Unit 4.3 – Reinforcement Cutting and Bending	Recognizing and Selecting Accessories	To familiarize learners with the various accessories used for reinforcement cutting and bending machines and equip them with the ability to select the appropriate accessories based on reinforcement bar diameter, shape, and bending requirements.	CON/ N0205; PC1, PC2, PC3, KU9, KU10, KU11, KU12, GS1, GS2, GS3, GS4, GS5, GS6	Classroom lecture, games, group participation, group activity	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, Threading machine, Reinforcement steel bar, Binding wires, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit	T- 01:00 P- 04:00

			Cutting Reinforcement Bars	To demonstrate and teach learners the methods of placing reinforcement bars in different types of machines for cutting, using marking tools to determine cutting lengths, and employing tools such as hammers, chisels, and cutting machines for cutting reinforcement bars effectively.	CON/ N0205; PC4, PC5, KU1, KU2, KU3, KU4, GS1, GS2, GS3, GS4, GS5, GS6, GS9	Classroom lecture, games, group participation, group activity	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, Threading machine, Reinforcement steel bar, Binding wires, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit	T- 01:00 P- 04:00

			Bending Reinforcement Bars	To provide hands-on training to learners on using bending levers and bending machines to bend reinforcement bars accurately according to the shapes and dimensions specified in Bar Bending Schedules (BBS).	CON/ N0205; PC11, PC12, PC13, KU1, KU2, KU5, KU6, KU16, GS1, GS2, GS3, GS4, GS5, GS6, GS9	Classroom lecture, games, group participation, group activity	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, Threading machine, Reinforcement steel bar, Binding wires, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit	T- 01:00 P- 04:00

		Unit 4.4 – Storage and Handling of Bars	Maintaining Correct Body Posture	To emphasize the importance of maintaining proper body posture during the cutting and bending of reinforcement bars, ensuring the safety and well-being of workers while preventing musculoskeletal injuries.	CON/ N0205; PC6, KU20, GS1, GS2, GS3, GS4, GS5, GS6, GS10	Classroom lecture, games, group participation, group activity	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, Threading machine, Reinforcement steel bar, Binding wires, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit	T- 01:00 P- 04:00

			Tagging and Stacking Procedure	To instruct learners on the standard procedure for tagging and stacking reinforcement bars, emphasizing organization, safety, and ease of access for future use.	CON/ N0205; PC7, PC14, KU17, KU18, GS1, GS2, GS3, GS4, GS5, GS6, GS7	Classroom lecture, games, group participation, group activity	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, Threading machine, Reinforcement steel bar, Binding wires, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit	T- 01:00 P- 04:00

			Hands-on Tagging and Stacking	To provide practical training to learners, allowing them to demonstrate their ability to tag and stack reinforcement bars correctly according to the standard procedure, ensuring proper organization and safety measures are followed.	CON/ N0205; PC7, PC14, KU17, KU18, GS1, GS2, GS3, GS4, GS5, GS6, GS7	Classroom lecture, games, group participation, group activity	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, Threading machine, Reinforcement steel bar, Binding wires, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet, Safety goggles, Safety shoes, Safety belt, Cotton gloves, Ear plugs, Reflective jackets, Dust mask, Fire Prevention kit	T- 01:00 P- 04:00

5	Prepare reinforcement components for cage/ mesh fabrication of the R.C.C structures (CON/ N0206) T- 31:00 P- 66:00 (HH: MM)	Unit 5.1 – Reinforcement Bars	Types of Reinforcement Bars	Distinguish between different types of reinforcement bars, including Mild Steel, TOR steel, TMT steel, and their respective applications in construction, ensuring learners can select the appropriate type for various projects.	CON/ N0206; PC1, PC3, PC5, PC6, KU1, KU5, KU7, KU11, KU12, KU16, KU18, KU20, GS6, GS10, GS11	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

			Understanding Strength in Reinforcement Bars	Explain the differences in strength properties among reinforcement bar types, such as Mild Steel, TOR steel, and TMT steel, and illustrate how these differences influence their application and suitability for different structural requirements.	CON/N0206; PC1, PC3, PC5, KU1, KU2, KU5, KU7, KU9, KU11, KU12, KU16, KU18, KU20, GS6, GS10	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

			Mechanical Couplers in Reinforcement	Educate learners about the use and advantages of mechanical couplers in reinforcement work, enabling them to understand how these couplers enhance the integrity and performance of reinforced concrete structures.	CON/ N0206; PC2, PC4, PC7, PC8, PC9, PC12, PC15, PC19, KU10, KU14, KU22, KU23, KU24, GS5, GS6, GS10, GS12	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

			Installation of Mechanical Couplers	Provide a detailed explanation of the threading process for reinforcement bars used in mechanical coupler installation, ensuring learners can effectively prepare and join bars using couplers according to industry standards.	CON/ N0206; PC2, PC4, PC7, PC8, PC9, PC12, PC15, PC19, KU13, KU20, KU23, GS6, GS10	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

			Practical Application of Mechanical Couplers	Demonstrate the practical application of mechanical couplers in reinforcement work, allowing learners to gain hands-on experience in using couplers to connect reinforcement bars accurately and securely, promoting efficiency and structural integrity in construction projects.	CON/ N0206; PC2, PC4, PC7, PC8, PC9, PC12, PC15, PC19, KU5, KU13, KU20, KU24 GS6, GS7, GS10, GS12	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

		Unit 5.2: Features of Reinforcement and Interpretation	Understanding One-way and Two-way Slabs	Differentiate between one-way and two-way slabs, discussing their distinctive features, load distribution characteristics, and applications in construction.	CON/N0206; PC1, PC3, PC4, PC5, PC10, PC16, PC18, KU13, KU14, KU19, KU20, GS1, GS2, GS3, GS6, GS7, GS10, GS11	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

			Inter-preting Structural Drawings for Rein-forcement	Teach learners how to inter-pret structural drawings, sketches, and Bar Bending Schedules (BBS) accurate-ly to identify and understand the reinforce-ment compo-nents required for various RCC structures, ensuring they can contribute effectively to cage fabrica-tion.	CON/ N0206; PC1, PC2, PC3, PC4, PC5, PC10, PC16, PC18, KU4, KU5, KU6, KU9, KU10, KU11, KU15, KU17, KU19, KU20, GS2, GS4, GS6, GS7, GS9, GS10	Classroom lecture, games, group partici-pation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Mea-surement tape, Cutting ma-chine, Bend-ing machine, Threading ma-chine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechani-cal coupler, Cover blocks, Wooden planks, Rein-forcement bar tying machine, Lifting appli-ance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Re-flective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

			Analyzing Cage Fabrication Requirements	Analyze and interpret the specific reinforcement needs of different RCC structures based on provided drawings and BBS, allowing learners to assess the scope and materials required for cage fabrication.	CON/ N0206; PC1, PC2, PC3, PC4, PC5, PC10, PC16, PC18, KU3, KU4, KU5, KU7, KU8, KU10, KU11, KU15, KU17, KU19, GS2, GS4, GS6, GS7, GS9, GS10, GS11, GS12	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

			Detailing Reinforcement for Slabs	Focus on the reinforcement details, such as bar diameter, spacing, lap lengths, and layout patterns, necessary for effective cage fabrication in slabs while interpreting structural drawings and BBS.	CON/ N0206; PC1, PC2, PC3, PC4, PC5, PC10, PC16, PC18 KU4, KU5, KU6, KU9, KU10, KU11, KU15, KU17, KU19, KU20, GS2, GS4, GS6, GS7, GS9, GS10, GS11, GS12	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

			Practical Application of Interpretation Skills	Provide hands-on practice in interpreting drawings, sketches, and BBS to determine reinforcement component requirements for cage fabrication, allowing learners to apply their knowledge and skills in real-world scenarios accurately.	CON/ N0206	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 05:00

		Unit 5.3: Reinforcement Preparation and Handling	Cutting and Bending for Cage Fabrication	Demonstrate the proper techniques for cutting and bending reinforcement bars to prepare materials for cage fabrication in RCC structures according to specified requirements.	CON/ N0206; PC4, PC5, PC6, PC13, PC14, KU1, KU6, KU10, KU13, GS5, GS6, GS7, GS10	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 05:00

			Lap Joints in Reinforcement Bars	Describe the importance of lap joints in reinforced concrete structures, outlining the requirements and methods for creating effective lap joints.	CON/ N0206; PC2, PC4, PC5, PC7, PC13, PC14, KU13, KU16, KU18, GS6, GS7, GS10, GS11	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 05:00

			Lap Length and Development Length Calculation	Teach learners how to calculate the lap length and development length for reinforcement bars of various diameters, ensuring they understand the principles behind these calculations.	CON/N0206; PC6, PC7, KU12, KU16, KU18, GS6, GS10	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 05:00

			Hands-on Reinforcement Lapping	Provide practical training on lapping reinforcement bars, allowing learners to apply their knowledge by performing lapping for reinforcement bars of different diameters.	CON/ N0206; PC6, PC7, PC13, PC14 KU11, KU12, KU13, KU16, KU18, GS6, GS7, GS10, GS11	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 05:00

			Tagging and Stacking Reinforcement Materials	Instruct learners on the standard procedure for tagging and stacking prepared reinforcement materials, emphasizing organization, safety, and ease of access for future use in construction projects.	CON/ N0206; PC14, PC20, KU17, KU19, GS3, GS7, GS9, GS10, GS11, GS12	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 03:00 P- 05:00

6	Fixing Reinforcement Components to Fabricate Cage/ Mesh for the R.C.C Structures (CON/ N0206) T- 31:00 P- 66:00 (HH: MM)	Unit 6.1 – Interpretation and Classification of Reinforcement Components	Interpreting Drawings and Sketches for Reinforcement Work	After this session, learners should be able to interpret structural drawings and sketches accurately, identifying key reinforcement details and requirements for fabrication and fixing.	CON/ N0206; PC1, PC4, KU4, KU15 GS2, GS3, GS4, GS5, GS6, GS7, GS8	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

			Under-standing Types of Reinforce-ment Bars	By the end of this session, learners should be able to distinguish between var-ious types of reinforcement bars based on their materials and strength properties, understanding their suitability for different construction applications.	CON/ N0206; PC3, KU5, GS6, GS7, GS9	Classroom lecture, games, group partici-pation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Mea-surement tape, Cutting ma-chine, Bend-ing machine, Threading ma-chine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechani-cal coupler, Cover blocks, Wooden planks, Rein-forcement bar tying machine, Lifting appli-ance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Re-flective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

			Classification of Ties in Reinforcement Work	The goal of this session is to classify different types of ties used in reinforcement work based on their purpose and strength characteristics, ensuring learners can choose the appropriate ties for specific applications.	CON/ N0206; PC5, KU18, GS4, GS5, GS6	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

			Reading and Interpreting Bar Bending Schedules (BBS)	After this session, learners should be proficient in reading and comprehending Bar Bending Schedules (BBS) to determine the quantity, size, and placement of reinforcement bars required for construction projects.	CON/ N0206; PC6, PC10, KU10, GS2, GS3, GS4, GS5, GS6, GS7, GS8	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

			Applying Knowledge to Real-World Scenarios	In this practical session, learners will apply their knowledge gained from previous sessions to interpret actual structural drawings, select the correct reinforcement bars, classify ties, and interpret BBS accurately to plan for fabrication and fixing of reinforcement bars in specific construction scenarios.	CON/ N0206; PC1, PC4, KU4, KU10, KU15, KU18, GS2, GS3, GS4, GS5, GS6, GS7, GS8	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

		Unit 6.2: Features of Reinforcement and Interpretation	Insertion and Fixing Sequence for R.C.C Structural Elements	After this session, learners should be able to explain the correct insertion and fixing sequence for various R.C.C structural elements such as slabs, beams, columns, footings, walls, and staircases, ensuring proper understanding of the process.	CON/ N0206; PC2, PC11, KU11, GS4, GS5, GS6, GS7	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

			Utilizing Different Types of Ties in Reinforcement Work	By the end of this session, learners should be proficient in using various types of ties to secure different components of the RCC structure, ensuring structural integrity and alignment.	CON/ N0206; PC9, KU6, KU18, GS4, GS5, GS6, GS7	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

			Importance of Chairs, Spacer Bars, Hanger Bars, and Cover Blocks	The objective of this session is to emphasize the significance of chairs, spacer bars, hanger bars, and cover blocks in cage fabrication for maintaining correct thickness, spacing, alignment, and cover for reinforcement bars.	CON/ N0206; PC13, PC14, KU7, KU20, GS4, GS5, GS6, GS7	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

			Hands-on Practice: Placing and Fixing Chairs, Spacers, and Hanger Bars	In this practical session, learners will demonstrate their ability to place and fix chairs, spacer bars, and hanger bars correctly as per the standard practices, ensuring they can implement these crucial reinforcement components effectively in real-world scenarios.	CON/ N0206; PC13, PC14, KU7, KU20, GS4, GS5, GS6, GS7	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 04:00

			Safety Measures in Insertion and Fixing	The final session will focus on safety measures and guidelines to be followed during the insertion and fixing of reinforcement components, emphasizing the well-being of workers and compliance with safety regulations.	CON/ N0206; PC10, PC19, KU2, KU3, GS4, GS5, GS6, GS7, GS10	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 05:00

		Unit 6.3: Reinforcement Preparation and Handling	Shifting and Positioning of Pre-fabricated Cages	After this session, learners should understand the procedure and safety precautions involved in shifting and positioning pre-fabricated cages accurately at the construction site.	CON/ N0206; PC2, KU9, KU14, GS4, GS5, GS6, GS7	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 05:00

			Erecting Temporary Supports and Layout Marking	The objective is to equip learners with the skills to erect temporary supports and mark layouts for various RCC structures, ensuring the correct placement and alignment of reinforcement components.	CON/ N0206; PC2, KU9, KU14, GS4, GS5, GS6, GS7	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 05:00

			Marking, Insertion, and Initial Fixing of Reinforcement Components	By the end of this session, learners should be able to effectively mark, insert different reinforcement components, and provide initial fixing ties to fabricate the required cage according to specified drawings and layouts.	CON/ N0206; PC2, PC4, PC14, KU10, KU20, GS4, GS6, GS7	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 05:00

			Demonstrating Shifting and Positioning of Pre-fabricated Cages	In this practical session, learners will demonstrate their proficiency in shifting, positioning, and the final fixing of pre-fabricated cages as per project requirements, ensuring they can apply their knowledge in real construction scenarios.	CON/ N0206; PC2, PC4, KU9, KU14, GS4, GS5, GS6, GS7	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 02:00 P- 05:00

			Safety Measures in Cage Shifting and Fixing	The final session will focus on safety measures and guidelines to be followed during cage shifting, positioning, and final fixing, emphasizing the well-being of workers and compliance with safety regulations at construction sites.	CON/ N0206; PC10, PC19, KU2, KU3, GS4, GS5, GS6, GS7, GS10	Classroom lecture, games, group participation, group activity	Bar tying hook, Bending lever, Hack saw blade and frame, Measurement tape, Cutting machine, Bending machine, Threading machine, , M.S, TOR steel, TMT steel Binding wires, Steel cutting blade, Mechanical coupler, Cover blocks, Wooden planks, Reinforcement bar tying machine, Lifting appliance (Sling, Shackle, Belts), Safety Helmet , Safety goggles , Safety shoes , Safety belt, Cotton gloves, Ear plugs , Reflective jackets, Dust mask, Fire Prevention kit	T- 03:00 P- 05:00
7	Work effectively in a team to deliver desired results at the workplace (CON/ N8001) T- 09:00 P- 21:00 (HH: MM)	Unit 7.1 – Effective Communication and Teamwork	Roles and Responsibilities in the Workplace	By the end of this session, learners should be able to elucidate their own roles and responsibilities within the construction project, ensuring a clear understanding of their individual contributions to the team.	CON/ N8001; PC1, KU1, KU2, KU6, GS7, GS11	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00

			Effective Communication at the Workplace	The goal of this session is for learners to explain the importance of effective communication in a construction setting, highlighting its impact on project success, safety, and efficiency.	CON/ N8001; KU2, KU3, KU8, GS3, GS5, GS6, GS7, GS9, GS10	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00
			Teamwork and Problem Reporting	After this session, learners should be able to demonstrate the ability to effectively communicate work-related information to team members and show how to report any unresolved problems or issues to their supervisor promptly, fostering a culture of collaboration and timely issue resolution in the workplace.	CON/ N8001; PC1, PC2, PC3, KU2, KU8, GS4, GS5, GS6, GS7, GS9, GS10, GS11	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00
		Unit 7.2 – Working Effectively and Maintaining Discipline at Work	Creating a Cooperative Work Environment	By the end of this session, learners should be able to explain the importance of fostering a healthy and cooperative work environment among gangs of workers, promoting teamwork and collaboration on construction projects.	CON/ N8001; KU5, KU9, KU10, GS3, GS4, GS5, GS6, GS7, GS9, GS10, GS11	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00

			Knowledge Sharing and Effective Communication	The goal of this session is for learners to elucidate techniques related to work methods, material properties, tools, tackles, and safety standards that co-workers might need, emphasizing the importance of sharing knowledge and information for improved project quality, safety, and efficiency.	CON/ N8001; PC7, PC8, PC9, KU7, GS3, GS5, GS6, GS7, GS10, GS11	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00
			Synchronized Work and Support	After this session, learners should be able to demonstrate the ability to work together in a synchronized manner with co-workers, support colleagues facing problems, and efficiently hand over required materials, tools, equipment, and work fronts to interfacing teams, ensuring seamless project operations and problem resolution.	CON/ N8001; PC8, PC9, PC11, KU7, KU9, GS3, GS5, GS6, GS7, GS8, GS9, GS10, GS11	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00

		Unit 7.3 – Maintaining Social Diversity at Work	Understanding Gender Equality	By the end of this session, learners should have a fundamental understanding of the concept of gender equality, including its importance, principles, and relevance in the workplace.	CON/ N8001; PC11, KU10, GS5, GS6, GS7, GS8, GS10, GS11	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00
			Promoting Diversity and Inclusion	The goal of this session is to explain how to recognize and be sensitive to issues related to disability, culture, and gender, fostering an inclusive and respectful work environment.	CON/ N8001; PC10, KU11, GS5, GS6, GS7, GS8, GS10, GS11	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00
			Gender Sensitivity in the Workplace	In this session, learners will discuss legislation, policies, and procedures related to gender sensitivity and cultural diversity, and understand their impact on the workplace, ensuring compliance with relevant regulations and organizational standards.	CON/ N8001; PC12, KU12, GS5, GS6, GS7, GS8, GS10, GS11	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00

			Implementing Inclusive Practices	After this session, learners should be able to demonstrate effective implementation of gender-neutral practices in the workplace, promoting diversity, and ensuring that all employees are treated fairly and equitably. Additionally, they should be able to address discriminatory and offensive behavior professionally and in accordance with organizational policy.	CON/ N8001; PC12, KU12, GS5, GS6, GS7, GS8, GS10, GS11	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 00:00 P- 03:00
8	Prioritise Activities and Organise Resources (CON/ N8002) T- 09:00 P- 21:00 (HH: MM)	Unit 8.1 – Prioritise Work Activities to Achieve Desired Results	Understanding Labor and Work Productivity	By the end of this session, learners should be able to explain the basic concepts of labor productivity and work productivity, distinguishing between the two and understanding their importance in construction projects.	CON/ N8002; PC1, PC10, PC11, KU1, KU4, KU5, GS5, GS6, GS7, GS9, GS10	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00

			Planning for Productivity	The goal of this session is for learners to identify work targets, plan activities, and describe the process of planning tasks and activities relevant to their trade or job role, ensuring efficient and productive work execution.	CON/ N8002; PC1, PC2, PC3, KU2, KU3, KU4, KU6, KU7, GS7, GS8, GS9, GS10	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00
			Sequencing and Flow of Work	After this session, learners should be able to explain the work plan, sequence of activities, and flow of work in a logical order for their assigned tasks, ensuring optimal productivity and resource utilization.	CON/ N8002; PC4, PC5, PC6, PC7, KU6, KU7, KU8, KU10, GS3, GS5, GS6, GS7, GS8	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00
			Resource Management and Prioritization	By the end of this session, learners should be proficient in selecting the required materials and tools, prioritizing activities, and requisitioning resources effectively, maximizing output and project efficiency.	CON/ N8002; PC7, PC8, PC9, PC13, KU4, KU6, KU7, KU8, KU10, KU12, GS3, GS6, GS7, GS8, GS9, GS10	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00

			Practical Resource Requisition	The objective of this session is for learners to demonstrate the process of requisitioning resources, citing a practical example, and reporting resource requirements both orally and in writing to the relevant authorities, ensuring smooth project operations.	CON/ N8002; PC6, PC9, PC11, KU2, KU4, KU5, KU6, KU7, KU8, KU12, GS1, GS2, GS3, GS5, GS6, GS7, GS9, GS10	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00
		Unit 8.2 – Organising Resources	Minimizing Resource Wastage	By the end of this session, learners should be able to explain strategies and techniques to minimize wastage of resources, ensuring efficient resource management in construction activities.	CON/ N8002; PC10, PC11, KU8, KU10, GS1, GS5, GS6, GS9, GS10	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00
			Optimal Resource Utilization	The goal of this session is for learners to demonstrate the optimum use of resources while performing domain-specific work activities, maximizing efficiency and reducing unnecessary consumption.	CON/ N8002; PC11, KU6, KU8, KU10, GS6, GS7, GS9, GS10	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00

			Waste Collection and Disposal Procedures	After this session, learners should be able to demonstrate the proper procedures for waste collection and disposal in accordance with organizational norms, maintaining cleanliness and safety at the worksite.	CON/ N8002; PC5, KU1, KU8, KU10, GS1, GS2, GS5, GS9, GS10	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00
			Planning for Waste Management	The objective of this session is for learners to explain a comprehensive plan for waste collection and disposal after completing a task, ensuring compliance with environmental regulations and site cleanliness.	CON/ N8002; PC5, PC15, KU1, KU8, KU10, GS1, GS2, GS5, GS9, GS10	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 01:00 P- 02:00
			Timely Task Completion	By the end of this session, learners should be able to demonstrate the ability to complete work within the stipulated time and as per the planned schedule, contributing to project efficiency and meeting project deadlines.	CON/ N8002; PC14, PC15, KU1, KU8, GS1, GS2, GS5, GS9, GS10	Classroom lecture, games, group participation, group activity	Black/White board, marker, Projector/ LED Monitor, Computer, Trade specific charts, Safety tags, Safety Notice board, registers and other teaching aids	T- 00:00 P- 03:00

9	CON/ N9001: Follow safety norms as defined by organization, adopt healthy and safe work practices T- 05:00 P- 21:00 (HH: MM)	Unit 9.1 – Hazards and Emergency Situations	Types of hazards at the construction sites and identify the hazards specific to the domain related works	Understand and categorize various types of hazards commonly found at construction sites, including physical, chemical, biological, and ergonomic hazards. Identify hazards specific to the domain-related works being carried out, such as electrical hazards for electricians or fall hazards for roofers. Recognize the potential risks associated with each hazard and their impact on worker safety.	CON/ N9001, PC1, PC6, KU2, KU6, KU7, KU16, GS6, GS7	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Safety goggles, Nose mask, Ear protection, Safety tags, Safety Notice board	T- 01:00 P- 01:00
			Recognize the safety control measures and actions to be taken under emergency situation	Familiarize oneself with safety control measures and precautions to mitigate identified hazards. Learn the actions to be taken under emergency situations, including evacuation procedures, first aid response, and alerting the appropriate authorities. Understand the importance of quick and effective responses in emergency scenarios to minimize harm and property damage.	CON/ N9001, PC2, PC4, PC11, KU4, KU16, GS6, GS7	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Fire extinguishers, Fire prevention kit, Safety Notice board	T- 01:00 P- 01:00

			Reporting procedure to the concerned authority in case of emergency situations	Comprehend the step-by-step reporting procedure to inform the concerned authorities in the event of emergencies, accidents, or hazardous incidents. Learn how to provide accurate and timely information, including location, nature of the emergency, and the number of individuals affected.	CON/ N9001, PC1, PC2, PC17, KU1, GS1, GS2, GS4, GS5, GS6, GS7, GS8, GS9, GS10, GS11	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Safety Notice board, Safety tags	T- 00:00 P- 01:00
		Unit 9.2 - Safety Drills, PPEs and Fire Safety	The classes of fire and types of fire extinguishers	Explore the different classes of fires (e.g., Class A, B, C, D, and K) and their characteristics. Identify the suitable types of fire extinguishers corresponding to each fire class and their appropriate use.	CON/ N9001, PC5, KU12, KU13, GS1, GS2, GS4, GS5, GS6, GS7, GS8, GS9, GS10, GS11	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Fire extinguishers, Safety Notice board	T- 01:00 P- 01:00

			The operating procedure of the fire extinguishers	Understand the step-by-step procedure for safely operating fire extinguishers, including pulling the pin, aiming at the base of the fire, squeezing the handle, and sweeping from side to side. Learn when and how to use fire extinguishers effectively to suppress fires and prevent their spread.	CON/ N9001, PC5, KU12, KU13, GS1, GS2, GS4, GS5, GS6, GS7, GS8, GS9, GS10, GS11	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Fire extinguishers, Safety Notice board	T- 01:00 P- 01:00
			The importance of participation of workers in safety drills	Recognize the significance of active participation in safety drills and training exercises. Understand how safety drills enhance preparedness and ensure that workers know how to respond during emergencies.	CON/ N9001, PC4, KU4, GS6, GS7	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Safety Notice board	T- 01:00 P- 01:00
			Basic medical tests required for working at construction site	Identify the essential medical tests that may be required before starting work at a construction site, such as physical examinations, vision tests, hearing tests, and drug screenings. Understand how these tests contribute to worker health and safety.	CON/ N9001, PC13, KU9, KU10, GS6, GS7	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, First Aid box, Safety Notice board	T- 00:00 P- 01:00

			Purpose and importance of vertigo test at construction site	Learn about vertigo tests and their relevance in assessing a worker's balance and coordination, especially for tasks involving heights. Understand how vertigo tests help prevent accidents related to dizziness or loss of balance.	CON/ N9001, PC13, KU9, GS6, GS7	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Safety goggles, Safety Notice board	T- 00:00 P- 01:00
			Types and benefits of basic ergonomic principles, which should be adopted while carrying out specific task at the construction sites	Explore various ergonomic principles applicable to specific tasks at construction sites, such as proper lifting techniques, posture, and equipment adjustments. Understand the benefits of adopting ergonomic practices, including reduced risk of musculoskeletal injuries and increased productivity.	CON/ N9001, PC14, KU3, KU11, GS6, GS7	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Safety goggles, Safety tags, Safety Notice board	T- 00:00 P- 01:00

			Use of PPEs as per work require-ments	Identify the specific PPE items required for different work con-ditions and tasks, such as helmets, safety goggles, ear protection, gloves, and respiratory protection. Learn when and how to correctly wear and use PPE to safeguard against work-place hazards.	CON/ N9001, PC7, KU5, GS1, GS2, GS3, GS4, GS5, GS6, GS7, GS8, GS9, GS10, GS11	Classroom lecture, games, group partici-pation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Pro-jector, Lap-top, Leather Hand Gloves, Jumpsuit, Hand and Leg guard leather, Safety goggles, Nose mask, Ear protection, Welding hel-met, Welding glass, Safety tags, Safety Notice board	T- 00:00 P- 01:00
		Unit 9.3 - Hygiene and Safe Waste Disposal Practices	Follow the prac-tices to maintain personal hygiene, workplace hygiene and site/ workplace sanitiza-tion	Understand the importance of personal hygiene and the role it plays in preventing the spread of illnesses in the workplace. Learn about best practices for maintaining cleanliness in the workplace, including sanitization measures to reduce health risks.	CON/ N9001, PC15, KU14, KU15, KU18, GS1, GS2, GS4, GS5, GS6, GS7, GS8, GS9, GS10, GS11	Classroom lecture, games, group partici-pation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Pro-jector, Laptop, Nose mask, Safety tags, Safety Notice board	T- 01:00 P- 01:00
			The im-portance of house-keeping works	Recognize the significance of housekeeping in maintain-ing a safe and organized work environment. Understand how proper housekeeping practices con-tribute to ac-cident preven-tion, improved efficiency, and overall site safety.	CON/ N9001, PC15, PC16, KU15, GS6, GS7	Classroom lecture, games, group partici-pation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Pro-jector, Laptop, Sand buckets, Safety tags, Safety Notice board	T- 01:00 P- 01:00

			Keep an eye on safe house-keeping practices	Learn how to proactively observe and ensure the implementation of safe housekeeping practices at construction sites. Identify potential hazards related to housekeeping and take corrective actions or report issues to maintain a safe working environment.	CON/ N9001, PC16, KU15, GS6, GS7	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Safety tags, Safety Notice board	T- 00:00 P- 01:00
			Different types of waste at construction sites and their disposal method	Identify various types of waste generated at construction sites, including non-combustible scrap, combustible debris, general construction waste, and hazardous materials. Understand the appropriate disposal methods for each waste type, including recycling, landfill disposal, and hazardous waste disposal.	CON/ N9001, PC9, PC13, KU7, KU8, KU9, KU10, GS1, GS2, GS4, GS5, GS6, GS7, GS8, GS9, GS10, GS11	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Sand buckets, Flashback arrestors, Safety tags, Safety Notice board	T- 00:00 P- 01:00

			Know safe waste disposal practices followed at construction site	Familiarize oneself with safe waste disposal practices and regulations governing waste management at construction sites. Learn how to segregate, handle, and dispose of different types of waste materials in compliance with environmental standards.	CON/ N9001, PC9, KU7, KU8, KU9, KU10, GS1, GS2, GS4, GS5, GS6, GS7, GS8, GS9, GS10, GS11	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Sand buckets, Safety tags, Safety Notice board	T- 00:00 P- 01:00
		Unit 9.4 - Infectious Disease and Its Cure	Different types of infectious disease that can spread/ originate at a construction site	Learn about various infectious diseases that can potentially spread or originate at construction sites, including respiratory infections, skin diseases, and vector-borne diseases. Understand the health risks associated with infectious diseases and their potential impact on the workforce.	CON/ N9001, PC16, KU7, KU16, KU17, KU19, GS6, GS7	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Nose mask, Ear protection, Safety tags, Safety Notice board	T- 01:00 P- 01:00

			The ways of transmission of the various infectious disease	Explore the different modes of transmission for infectious diseases, such as direct contact, airborne transmission, and vector-borne transmission. Recognize how infectious diseases can spread among workers and the importance of preventive measures.	CON/ N9001, PC16, KU6, KU17, GS6, GS7	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Nose mask, Ear protection, Safety tags, Safety Notice board	T- 01:00 P- 01:00
			Methods to check the spread of the infectious disease	Learn effective methods and preventive measures to control the spread of infectious diseases at construction sites, including vaccination programs, hygiene practices, and sanitation measures. Understand the role of personal and collective responsibility in disease prevention.	CON/ N9001, PC16, KU16, KU17, GS6, GS7	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Nose mask, Ear protection, Safety tags, Safety Notice board	T- 00:00 P- 01:00
			Symptoms and cure of the various infectious disease	Identify common symptoms associated with infectious diseases and the importance of early detection. Gain knowledge about available treatments, preventive measures, and the importance of seeking medical attention when symptoms arise.	CON/ N9001, PC16, KU17, GS6, GS7	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, First Aid box, Safety tags, Safety Notice board	T- 00:00 P- 01:00

			Procedure to report to the concerned authority regarding the outbreak/ hazard of any infectious disease/ pandemic	Understand the procedure for promptly reporting outbreaks or hazards related to infectious diseases to the concerned authorities. Learn how to provide essential information and follow reporting protocols during a disease-related emergency or pandemic.	CON/ N9001, PC17, KU19, GS6, GS7	Classroom lecture, games, group participation, group activity, field visit	Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop, Safety tags, Safety Notice board	T- 00:00 P- 02:00
10	DGT/ VSQ/ N0102: Employability Skills (60 Hours)	Unit 10.1: Employability Skills	Introduction to Employability Skills	Discuss the Employability Skills required for jobs in various industries. List different learning and employability related GOI and private portals and their usage.	DGT/VSQ/ N0102	Classroom lecture, games, group participation, group activity, field visit	Handbook	2
			Constitutional values - Citizenship	Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen. Show how to practice different environmentally sustainable practices.	DGT/VSQ/ N0102	Classroom lecture, games, group participation, group activity, field visit	Handbook	2

			Becoming a Professional in the 21st Century	Discuss importance of relevant 21st century skills. Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life. Describe the benefits of continuous learning.	DGT/VSQ/N0102	Classroom lecture, games, group participation, group activity, field visit	Handbook	2
			Basic English Skills	Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone. Read and interpret text written in basic English. Write a short note/paragraph / letter/e -mail using basic English.	DGT/VSQ/N0102	Classroom lecture, games, group participation, group activity, field visit	Handbook	4

			Career Development & Goal Setting	By the end of this training, participants should be able to prepare a comprehensive career development plan that distinguishes between a job and a career and outlines short- and long-term goals based on their aptitude.	DGT/VSQ/N0102	Classroom lecture, games, group participation, group activity, field visit	Handbook	4
			Communication Skills	Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette. Explain the importance of active listening for effective communication. Discuss the significance of working collaboratively with others in a team.	DGT/VSQ/N0102	Classroom lecture, games, group participation, group activity, field visit	Handbook	4
			Diversity & Inclusion	Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD. Discuss the significance of escalating sexual harassment issues as per POSH act.	DGT/VSQ/N0102	Classroom lecture, games, group participation, group activity, field visit	Handbook	2

			Financial and Legal Literacy	Outline the importance of selecting the right financial institution, product, and service. Demonstrate how to carry out offline and online financial transactions, safely and securely. List the common components of salary and compute income, expenditure, taxes, investments etc. Discuss the legal rights, laws, and aids.	DGT/VSQ/N0102	Classroom lecture, games, group participation, group activity, field visit	Handbook	8

			Essential Digital Skills	Describe the role of digital technology in today's life. Demonstrate how to operate digital devices and use the associated applications and features, safely and securely. Discuss the significance of displaying responsible online behavior while browsing, using various social media platforms, e-mails, etc., safely and securely. Create sample word documents, excel sheets and presentations using basic features utilize virtual collaboration tools to work effectively.	DGT/VSQ/N0102	Classroom lecture, games, group participation, group activity, field visit	Handbook	6

			Entrepreneurship	Explain the types of entrepreneurship and enterprises. Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan. Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement. Create a sample business plan, for the selected business opportunity.	DGT/VSQ/N0102	Classroom lecture, games, group participation, group activity, field visit	Handbook	14
			Customer Service	Describe the significance of analysing different types and needs of customers. Explain the significance of identifying customer needs and responding to them in a professional manner. Discuss the significance of maintaining hygiene and dressing appropriately.	DGT/VSQ/N0102	Classroom lecture, games, group participation, group activity, field visit	Handbook	8

			Getting Ready for apprenticeship & Jobs	Create a professional Curriculum Vitae (CV). Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively. Discuss the significance of maintaining hygiene and confidence during an interview. Perform a mock interview. List the steps for searching and registering for apprenticeship opportunities.	DGT/VSQ/N0102	Classroom lecture, games, group participation, group activity, field visit	Handbook	4

Annexure – II

Assessment Weightage	
Job Role	Bar Bender & Steel Fixer
Qualification Pack	CON/Q0203
Sector Skill Council	Construction

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

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
CON/N0204 - Read and understand routine drawings / sketches and Bar Bending Schedule(BBS)	30	70	0	0	100	20
CON/N0205 - Use hand and power tools for cutting and bending of reinforcement bars	30	70	0	0	100	25
CON/N0206 - Prepare, fabricate, place and fix reinforcement bars for RCC structures	30	70	0	0	100	25
CON/N8001 - Work effectively in a team to deliver desired results at the workplace	30	70	0	0	100	8
CON/N8002 - This unit describes the knowledge and the skills required for an individual to plan and organize own work in order to meet expected outcome	30	70	0	0	100	7
CON/N9001 - Work according to personal health, safety and environment protocols at construction site	30	70	0	0	100	10
DGT/VSQ/N0102 - Employability Skills (60 Hours)	20	30	0	0	50	5
Total	**200**	**450**	**0**	**0**	**650**	**100**

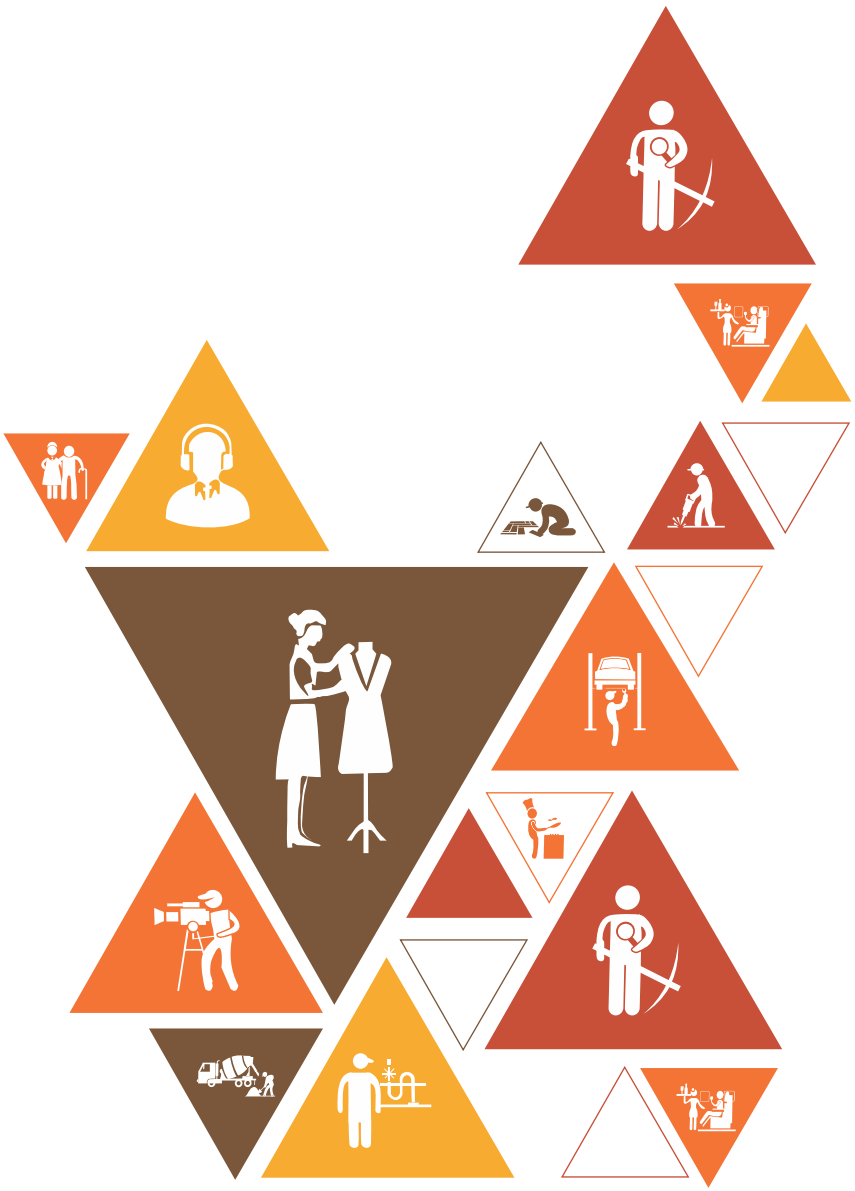
Annexure - III

Links for Video – QR Codes

Chapter Name	Unit Name	Topic Name	URL	QR Code
Chapter 1: Introduction of Construction Sector and Job Role	UNIT 1.1: Construction Industry in India	Overview of Construction Sector in India	https://youtu.be/yhjDhav4P-fw	Overview of Construction Sector in India
	UNIT 1.2: About Bar Bending & Steel Fixing Occupation	Responsibilities of Bar Bender and Steel Fixer	https://youtu.be/CVCsC8rLuy4	Responsibilities of Bar Bender and Steel Fixer
Chapter 2: Generic Mathematical Skills	Unit 2.1 – Unit Conversion and Measurement	Different System of Measurement	https://youtu.be/H1xo5UV-JKVo	Different System of Measurement
	Unit 2.2 – Basic Geometrical Shapes and its Properties	Area, volume and perimeter of geometrical shapes	https://youtu.be/OhTubw4C-0to	Area, volume and perimeter of geometrical shapes
	Unit 2.3 – Pythagoras Theorem and its Application	Pythagoras Theorem Application	https://youtu.be/l43fgfJ376c	Pythagoras Theorem Application
	Unit 2.4 – Basic Trigonometry	Practical Geometry and Trigonometry in Construction	https://youtu.be/BIsnSGN-4pfE	Practical Geometry and Trigonometry in Construction

Chapter 3: Read Drawings / Sketches and Bar Bending Schedule (BBS)	Unit 3.1 – Bar Bending Drawings	BBS Basic Concept	https://youtu.be/X8sE2kR-kBI	BBS Basic Concept
	Unit 3.2 – Bar Bending Schedule (BBS)	Bar Bending schedule	https://youtu.be/zGJD-7coCF0Q	Bar Bending schedule
Chapter 4: Using Hand and Power Tools for Cutting and Bending of Reinforcement	Unit 4.1 – Reinforcement Bars	Types, Grades, and Diameters of Reinforcement Bars	https://youtu.be/lQb-KYg-DN8s	Types, Grades, and Diameters of Reinforce-ment Bars
	Unit 4.2 – Tools and Machines required	Hand and Power Tools	https://youtu.be/Nlh1CX-fw880	Hand and Power Tools
	Unit 4.3 – Reinforcement Cutting and Bending	How to Cut and Bend Rebar	https://youtu.be/HEbhSDe-Jq20	How to Cut and Bend Rebar
	Unit 4.4 – Storage and Handling of Bars	Storage and Stacking of Reinforcement Bars	https://youtu.be/WA1PW-w6Re2E	Storage and Stacking of Reinforcement Bars

Chapter 5: Prepare Reinforcement Components for Cage/ Mesh Fabrication of the R.C.C Structures	Unit 5.1: Understanding Reinforcement Bars	Different Types of Ties Used in Reinforcement Work	https://youtu.be/ldLNOm-p3olA	 Different Types of Ties Used in Reinforcement Work
	Unit 5.2: Features of Reinforcement and Interpretation	One Way and Two Way Slabs	https://youtu.be/tIZP-tX9b3Y	 One Way and Two Way Slabs
	Unit 5.3: Reinforcement Preparation and Handling	Steel Cage Fabrication for Piles	https://youtu.be/Rcoc7FV50uA	 Steel Cage Fabrication for Piles
Chapter 6: Fixing Reinforcement Components to Fabricate Cage/ Mesh for the R.C.C Structures	Unit 6.1: Interpretation and Classification of Reinforcement Components	Tools used for Tying Rebar	https://youtu.be/34mtp-no_3pE	 Tools used for Tying Rebar
	Unit 6.2: Fixing Reinforcement Components and Cage Fabrication	Chair Bar in Construction Work	https://youtu.be/cJ01Ws-SoKnA	 Chair Bar in Construction Work
	Unit 6.3: Shifting, Positioning, and Final Fixing	Bar bending schedule of single mesh isolated footing	https://youtu.be/lUJ_krF36Cc	 Bar bending schedule of single mesh isolated footing



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