

# Facilitator Guidebook

## CRANE INSPECTOR (SAFETY)



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## **CRANE INSPECTOR (SAFETY)**

**Sector:- Cross Sectoral**

**Sub-Sector:- Hydrocarbon, Iron & steel, Mining,  
Power, Automotive, Construction, Infrastructure,  
Chemicals & Petrochemicals**

**Occupation:- Lifting & Rigging Engineering &  
Management.**

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## Acknowledgments

The Facilitator Guidebook for **Crane Inspector (Safety), SSD/Q0304**, developed by the **Safety Skill Development Foundation (SSDF)**, reflects our commitment to industry requirement for the job role, best practices in the profession, quality training requirement, regulatory compliances, workplace safety, health and sustainable practices. This guide is enriched with insights from **Subject Matter Experts (SMEs), trainers, and industry professionals**, ensuring its relevance to real-world applications.

We extend our special thanks to **CORE-EHS Solutions Pvt Ltd** for their invaluable expertise and support in developing course materials, significantly enhancing the safety and quality aspects of this guide.

Our gratitude also goes to trainers, assessors, industry experts, government bodies, and sector skill councils for their contributions toward advancing occupational safety across industries, including Hydrocarbon, Iron & Steel, Mining, Power, Automotive, Construction, Chemicals & Petrochemicals, and more.

The qualification is aligned with **NSQF** and this guide supports the **Skill India** initiative and is dedicated to trainers committed to excellence in skill development. SSDF welcomes feedback for continuous improvement.

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### About this Guide Book

The increasing attention towards safety issues in heavy industries, including machinery and lifting, creates a great need for competent professionals in safety. One such professional is the Crane Inspector (Safety), and their necessity has grown due to industries increasing attention towards decreasing the frequency of accidents and making crane operation safer. This increasing demand requires a strong training framework that equips individuals with the necessary expertise to inspect, assess, and ensure crane operation safety.

This Facilitator Guide is designed to thoroughly train skills and enhance the knowledge of persons who intend to become competent Crane Inspector (Safety) Safety Trainers. It provides a much-needed resource for trainers as they train the next generation of safety professionals in this very specialized field.

This guide is core competencies centring on inspection of cranes, with regards to safety and regulatory standards that should be achieved, risk assessments, and even essential operational procedures required for accident prevention. Trainers shall be qualified to train and upskill candidates for this very important responsibility concerning crane safety in all sectors.

By following this book, trainers would be able to upgrade their instructional techniques and design efficient training courses for the successful facilitation of a general safety culture in those industries using cranes to handle and lift heavy items.

This Facilitator Guide is designed based on the Qualification Pack (QP) under the National Skill Qualification framework (NSQF) and it comprises of the following National Occupational Standards (NOS)/topics and additional topics.
























1. **SSD/N0327 v 1.0 : Introduction to Lifting and Rigging Operations**
2. **SSD/N0328 v 1.0 : Crane Operational Mechanisms and Systems**
3. **SSD/N0329 v 1.0 : Inspection, Maintenance, and Certification of Lifting Equipment**
4. **SSD/N0330 v 1.0 : Legal and Regulatory Compliance for Lifting Operations**
5. **SSD/N0331 v 1.0 :Hazard Identification, Risk Assessment, and Incident Reporting in Lifting Operation.**
6. **SSD/N0332 v 1.0 : Safety of Plant, Machinery and Vehicle in Lifting Operation**
7. **SSD/N0333 v 1.0 : Planning and Organizing Lifting & Rigging and Emergency Protocols**
8. **SSD/N0334 v 1.0 : Load Planning and Stability Control in Lifting Operation.**
9. **SSD/N0335 v 1.0 : Communication and Team Coordination in Lifting Operations.**
10. **SSD/N0336 v 1.0 : Health, Hygiene and Environment Protocols for Lifting & Rigging Operations.**
11. **DGT/VSQ/0102 : Employability Skills**

The guide focuses on the core competencies required for crane inspections, which include safety protocols, regulatory standards, risk assessment, and the operational procedures that are essential to prevent accidents. Trainers using this guide will be equipped to educate and upskill trainees, enabling them to take up the crucial responsibility of ensuring crane safety across various sectors.

Trainers are educated through this guide on how best to perfect training delivery skills in upholding the culture of safety with any industry undertaking material handling or heavy lifts in the use of cranes.

### Symbols Used

### Symbols Used

 Steps	 Time	 Tips	 Notes	 Objectives	 Do
 Ask	 Explain	 Elaborate	 Field Visit	 Practical	 Lab
 Demonstrate	 Exercise	 Team Activity	 Facilitation Notes	 Learning Outcomes	 Say
 Resources	 Activity	 Summary	 Role Play	 Example	

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## 1. Unit 1 Introduction

### 1.1. Key Learning Outcomes

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

- Describe Hydrocarbon, Iron & steel, Mining, Power, Automotive, Construction, Chemicals & Petrochemicals
- List the roles and responsibilities of Safety Executive (OSHE)

### 1.2. Unit 1.1: Overview of the Industry

#### 1.2.1. Unit Objectives

**At the end of this unit, students will be able to:**

1. Describe about the Hydrocarbon sector in India
2. Describe about the Iron & Steel sector in India
3. Describe about the Mining sector in India
4. Describe about the Power sector in India
5. Describe about the Automotive sector in India
6. Describe about the Construction sector in India
7. Describe about the Chemicals & Petrochemicals in India
8. Describe how each sub-sector contributes to skill development
9. Compare the job potential of all sub-sectors

#### 1.2.2. Resources to be used

- Available objects such as Projection screen, whiteboard, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Attendance sheet
- Activities (role plays and games)

#### 1.2.3. Ask

- Ask the participants to share their expectations from the program
- Ask them to tell what they know about the Hydrocarbon sector, Iron & Steel sector, Mining sector, Power sector, Automotive sector, Construction sector, Chemicals & Petrochemicals
- What is the 'Make-in-India' initiative?

#### 1.2.4. Do

- Introduce yourself to the participants.
- Give an overview of the program to the participants - duration of the program, objective etc.
- Give an overview of the Hydrocarbon sector, Iron & Steel sector, Mining sector, Power sector, Automotive sector, Construction sector, Chemicals & Petrochemicals sector in India.

#### 1.2.5. Explain

List the major segments in the Hydrocarbon sector, Iron & Steel sector, Mining sector, Power sector, Automotive sector, Construction sector, Chemicals & Petrochemicals sector

### 1.2.6. Tips

- Go slow with information flow with participants.
- Observe each participant's body language.
- Keep a positive and supportive approach towards the candidates

### 1.2.7. Activity: Team Spot

- Separate the class in 2 different teams.
- Each team will be assigned with 3 different sector topics
- Ask them to present the given topics team after team, and state examples individually to explain

### 1.2.8. Notes for Facilitation

- Revise the important points discussed in this unit.
- Clear the doubts of the students, if any. Encourage them to ask questions.
- Discuss the question with the class and answer their queries satisfactorily.
- Help participants identify how to apply the skills taught in the course to their work
- Praise participants and the group on improving their performance and developing new skills.
- Encourage participants to move through the initial difficulties of learning new skills, by focusing on steps in their progress and the importance of what they are learning to do.

### 1.2.9. Summary

- **Hydrocarbon:** The hydrocarbon sector involves the extraction, refinement, and distribution of oil and natural gas. This sector plays a crucial role in energy production and the global economy, providing fuel and raw materials for various industries.
- **Iron & Steel:** The iron and steel sector is fundamental to industrial development. It focuses on producing metal alloys used in manufacturing, construction, and infrastructure. This sector is key to building economies and supporting technological advancements.
- **Mining:** The mining industry is concerned with extracting valuable minerals and materials from the earth. It provides essential raw materials for industries like construction, energy production, and manufacturing.
- **Power:** The power sector includes the generation, transmission, and distribution of electricity. This sector is vital to economic development and daily life, powering homes, businesses, and industries through a variety of sources such as coal, natural gas, renewables, and nuclear energy.
- **Automotive:** The automotive sector involves the design, production, and distribution of motor vehicles, including cars, trucks, and motorcycles. It is a significant driver of technological innovation and economic activity globally.
- **Construction:** The construction sector is involved in the building and infrastructure development of residential, commercial, and industrial projects. It supports urbanization and economic development by creating critical infrastructure such as roads, bridges, and buildings.
- **Chemicals & Petrochemicals:** This sector deals with the production of chemicals, fertilizers, and petrochemical products derived from petroleum. It plays a crucial role in manufacturing various goods such as plastics, pharmaceuticals, and industrial chemicals.

- A Safety Auditor assesses workplace safety practices, identifies hazards, ensures compliance with safety regulations, and recommends improvements to prevent accidents and ensure a safe working environment.

### 1.2.10. Exercise

Which of following is the most common cause of accidents in hydrocarbon sector?

- A. Equipment Failure
- B. Human Error
- C. Natural Disasters
- D. Fire

2. Routine inspections and maintenance are crucial for preventing accidents in oil and gas pipeline. (T/F)

3. Which of the following is major hazard in steel industry?

- A. Noise Pollution
- B. High Temperature
- C. Exposure to Hazardous Substance
- D. All the above

4. Proper PPE is essential for Workers handling molten metal. (T/F)

5. What is most common cause of fatalities in underground mines?

- A. Rock Falls
- B. Explosion
- C. Flooding
- D. Electrical Hazards

## 1.3. Unit 1.2: Roles and Responsibilities of a CRANE INSPECTOR (SAFETY)

### 1.3.1. Unit Objectives

**At the end of this unit, students will be able to:**

1. Identify roles and responsibilities of CRANE INSPECTOR (SAFETY)
2. Identify essential skills of CRANE INSPECTOR (SAFETY)

### 1.3.2. Resources to be used

- Available objects such as Projection screen, whiteboard, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Attendance sheet
- Activities (role plays and games)

### 1.3.3. Ask

- Ask the participants to share their expectations from the program

### 1.3.4. Do

- Give a brief introduction on the job description of CRANE INSPECTOR (SAFETY) outlining their personal attributes to the participants
- Provide the participants with a List of Roles and Responsibilities of CRANE INSPECTOR (SAFETY)

- Talk about the skills and knowledge which are essential to become a CRANE INSPECTOR (SAFETY)

### 1.3.5. Explain

Describe about the roles and responsibility of CRANE INSPECTOR (SAFETY)

### 1.3.6. Tips

- Go slow with information flow with participants.
- Observe each participant's body language.
- Keep a positive and supportive approach towards the candidates

### 1.3.7. Activity: Team Spot

- Separate the class in 2 different teams.
- Each team will be assigned with topics - Roles and responsibilities of CRANE INSPECTOR (SAFETY)
- Ask them to present the given topics team after team, and state examples individually to explain

### 1.3.8. Notes for Facilitation

- Revise the important points discussed in this unit.
- Clear the doubts of the students, if any. Encourage them to ask questions.
- Discuss the question with the class and answer their queries satisfactorily.
- Help participants identify how to apply the skills taught in the course to their work
- Praise participants and the group on improving their performance and developing new skills.
- Encourage participants to move through the initial difficulties of learning new skills, by focusing on steps in their progress and the importance of what they are learning to do.

### 1.3.9. Summary

#### **Carry Out Thorough Inspections:**

Regular and scheduled crane inspections to ensure adherence to safety standards and manufacturer recommendations.

Inspecting critical parts of the crane such as hoist, hook, boom, wire rope, brakes, and controls for signs of wear and damage.

Inspect operational functionality and safety features of limit switches, safety alarms, and emergency stop systems.

#### **Identify Potential Hazards:**

Mechanical, structural, or electrical defects and potential failure points that may compromise safety.

Environmental conditions analysis of temperature, weather, soil stabilization, etc, that may affect crane operation

Compliance check with the regulations

Ensure that the cranes are constructed according to local, National and International safe standards and legal requirements. i.e. OSHA and ANSI and ISO.

Ensure that it has all the pertinent permits and compliances

#### **Testing/Load Evaluation,**

Dynamic load testing among others to ensure safe operation at max capacity.

Load charts must be inspected, and markings on them should be clear and correct.

#### **Documentation and Reporting:**

Inspection records to be maintained and findings, recommendations, and corrective actions undertaken to be documented

Inspection reports to be prepared and submitted to the management or relevant regulatory authority on time

Issues noticed during inspection are to be recorded and tracked till resolution

**Recommend Maintenance and Repairs**

Based on inspection results, repairs, replacements, or adjustments should be recommended

Coordination with maintenance groups for the required repairs and overhauls.

**Monitor Safety Procedures:**

Ensure the crane operators have followed the safety procedures and the crane has been used within safe limits.

Educate the crane operators and site managers on how to operate the cranes properly along with safety practices.

**Certification Inspection:**

Ensure the cranes meet all requirements of certification, especially in hazardous industries, before their operation

Arrange for the recertification processes and maintain them as per industry norms.

**Training and Knowledge Transfer:**

Educate and train crane operators and maintenance personnel on best practices for safe operations and problems commonly encountered.

Be cognizant of new best practices, technological advances, and changes in the regulatory environment concerning crane inspection.

**Contact with Regulatory Authorities:**

Collaborate with local and national regulatory bodies, ensuring the crane meets all legal requirements.

Coordinate with external inspectors or agencies during audits or inspections.

**1.3.10. Exercise**

1. What is the primary responsibility of a Crane Inspector (Safety)?

- a) To operate the crane
- b) To maintain the crane in working condition
- c) To perform inspections and ensure safety compliance
- d) To train crane operators

2. When should a Crane Inspector (Safety) conduct a load test?

- a) After every operational shift
- b) Only after a crane accident
- c) As part of scheduled inspections or after maintenance
- d) Once a year regardless of condition

3. Crane Inspector (Safety)s only inspect the crane during its annual certification. (T/F)

4. Crane Inspector (Safety)s should ensure that crane operators follow the established safety protocols. (T/F)

5. Crane Inspector (Safety)s do not need to document their findings, as inspections are informal. (T/F)

6. A Crane Inspector (Safety) must verify that the crane has \_\_\_\_\_ and safety features in place, such as emergency stop buttons and limit switches.

7. \_\_\_\_\_ inspections are typically scheduled at regular intervals to assess the crane's condition.

## 2. Unit 2 NOS 1: . SSD/N0327 v1.0 : Introduction to Lifting and Rigging Operations

### 2.1. Key Learning Outcomes

At the end of this module, the trainees will be able to

- Understand the fundamentals of lifting and rigging operations.
- Understand roles, responsibilities, and functions of key personnel involved in lifting operations.
- Identify safety requirements and protocols for effective team collaboration.
- Understand communication and compliance with safety standards

### 2.2. Unit 2.1: Understand Fundamentals of Lifting and Rigging Operations

#### 2.2.1. Unit Objectives

At the end of this unit, students will be able to:

- To describe the basic principles involved in lifting, rigging, and load handling, including mechanical advantage, load distribution, and the importance of proper planning and risk assessment in lifting operations.
- To identify and describe the various tools and equipment commonly used in lifting operations, such as cranes, slings, hooks, shackles, and spreader bars, and explain their functions and applications in safe lifting practices.
- To determine and set the proper sling angles to ensure efficiency and safety in lifting operations.
- To recognize potential safety hazards associated with lifting and rigging operations, including load instability, equipment failure, and environmental factors, and the measures required to mitigate such hazards through proper training, supervision, and equipment checks.

#### 2.2.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

#### 2.2.3. Say

- Describe about basic principles involved in lifting, rigging, and load handling
- Describe about various tools and equipment
- Describe about proper sling angles
- Describe about potential safety hazards associated with lifting and rigging operations

#### 2.2.4. Explain

- Describe about basic principles involved in lifting, rigging, and load handling

- **Describe about various tools and equipment**
- **Describe about proper sling angles**
- **Describe about potential safety hazards associated with lifting and rigging operations**

### 2.2.5. Activity

Divide the class into small groups (3-4 members). Provide each group with a case study describing a lifting operation scenario (e.g., lifting a heavy beam with a crane).

Each group will discuss the principles involved in the scenario and explain how they would apply proper lifting and rigging techniques. They should also identify any potential risks involved in the operation.

After discussing in their groups, each group will present their case study analysis to the class, explaining the principles and safety measures they would implement.

Conclude the activity by summarizing the key principles discussed and reinforcing the importance of following safe practices during lifting operations.

### 2.2.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions.

### 2.2.7. Summary

Lifts and rigging is very important and fundamental in transporting heavy loads throughout construction, manufacturing, and logistical operations. Lifts and rigging involve all forms of activities of lifting or handling materials efficiently, securing to the point, using appropriate equipment while protecting the human being and environmental setting.

#### **Principle of Lifting, Rigging, and Load Handling**

The basic principles of lifting, rigging, and load handling constitute the basis of conducting safe and efficient operations. Proper planning for lifting operations should include knowledge of mechanical advantage, load distribution, and the choice of equipment. Rigging is defined as the installation of the pertinent equipment, including ropes, pulleys, and hoists, to safely lift and move the load. Proper load handling ensures that a load is well balanced and, therefore, when lifting, the same forces are exerted to prevent mishaps and machine damage.

#### **Identify General Tools Used in Lifting Operations**

The general tools used during lifting operations include a broad range of tools and equipment whose specific functionalities vary. Some of these include the cranes, slings, hooks, shackles, and finally, spreader bar. Lifting cranes are the main machines for use when lifting heavy loads. The load is secured using slings and hooks for lifting. Different equipment apply differently, and therefore, one should know how to select the right piece of equipment, inspect them, and learn how to apply them in correct usage for safety in operations.

#### **Explain the role of load stability and proper angles of slings in safe lifting**

Load stability is very crucial in the lifting process so that no shifting or loss of equilibrium occurs to the load. The correct sling angles play a vital role in keeping the load stable by distributing the lifting force uniformly across the slings. Very wide or narrow sling angles lead to excessive stress on the equipment or cause shifting of the load, which results in accidents. Thus, sling angles must be calculated and adjusted to achieve load stability and safe lifting of materials.

### **Identify Hazards of Safety in Lifting and Rigging Operations**

Many safety hazards arise from lifting and rigging operations. These involve equipment failure, environmental conditions, human error, and load instability. Examples that would be identified because of the hazard identification procedures pre operation and during the operation include those of common hazards of dropped loads, improper usage of rigging equipment, and bad weather conditions due to high wind or rain. All these risks can be mitigated through proper training, risk assessment, pre-operational equipment check, and maintenance of safety standards to ensure the safety of employees.

It is important, therefore, to understand the basic issues of lifting and rigging operations in terms of principles of safe lifting, choice, and utilization of proper tools and equipment, stability of loads and awareness to some safety hazards that may be probable during such operations. All these make it very efficient and most importantly, safe to perform a lifting operation in compliance with the above-mentioned aspects.

#### **2.2.8. Exercise**

1. Which of the following best describes the principle of rigging in lifting operations?
  - a) Only lifting a load using a crane
  - b) Setting up and securing the necessary equipment to lift a load safely
  - c) Only using slings for lifting
  - d) Handling the load after it has been lifted
2. What is the impact of incorrect sling angles during a lift?
  - a) It increases the weight of the load
  - b) It can cause uneven distribution of load forces, leading to equipment damage or accidents
  - c) It makes the lift faster
  - d) It has no impact on safety
3. Correct sling angles are important to ensure the load remains stable and evenly distributed during lifting. (T/F)
4. Lifting operations do not require a risk assessment if the weather is clear. (T/F)
5. Safety hazards in lifting and rigging operations can include load instability, equipment failure, and \_\_\_\_\_ conditions.
6. Lifting operations should always be preceded by a \_\_\_\_\_ to identify potential risks and ensure safety procedures are followed.

## **2.3. Unit 2.2 Identify Roles and Responsibilities of Key Personnel**

### **2.3.1. Unit Objectives**

**At the end of this unit, students will be able to**

- To explain the role and responsibility of a Crane Safety Inspector.
- To identify all key duties of crane operators for successfully performing lifts

- To describe the functions of riggers in preparing loads for lifting, including selection and inspection of rigging equipment, securing the loads correctly, and guiding the load during lifting to ensure balance and safety throughout the lifting process.

### 2.3.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 2.3.3. Say

- Describe about role and responsibility of a Crane Safety Inspector
- Describe about key duties of crane operators
- Describe about duties of Riggers
- Describe about role of the Rigging Supervisor

### 2.3.4. Explain

- Describe about role and responsibility of a Crane Safety Inspector
- Describe about key duties of crane operators
- Describe about duties of Riggers
- Describe about role of the Rigging Supervisor

### 2.3.5. Activity

Assign participant to different roles (Rigging Supervisor, Crane Operator, Riggers, Safety Inspector) and provide them with a lifting scenario (e.g., lifting a large construction component). The Rigging Supervisor must coordinate the team, ensure that all rigging activities are performed safely, and ensure clear communication between all team members.

After the role play, facilitate a discussion on the challenges the Rigging Supervisor faced during the exercise. How did they ensure that the team worked together effectively? What communication strategies were used?

Ask participant to reflect on the importance of leadership and coordination in lifting operations. How can a Rigging Supervisor help to prevent accidents and improve team performance?

Summarize the key skills and qualities that make a successful Rigging Supervisor, focusing on leadership, communication, and ensuring safety compliance.

### 2.3.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions.

### 2.3.7. Summary

**Discuss the role of the crane safety inspector in implementing safety standards**

The Crane Safety Inspector ensures that all equipment used in lifting operations meets the safety requirements and industry standards. This position involves conducting routine inspections of cranes, lifting devices, and rigging equipment to ensure they are in proper working condition. The Crane Safety Inspector identifies potential safety hazards, ensures compliance with legal requirements, and advises on necessary corrective actions or repairs to maintain safety throughout the operation.

#### **Crane Operator Responsibilities for Safe Execution of Lifts**

Crane operators oversee the safe performance of the lift, the observance of operating procedures, and the achievement of a safe and accident-free completion of the lift. They perform pre-lift checks, check load charts, and ensure that the crane is within its safe working limits. Operators also need to be in constant communication with riggers and supervisors, monitor environmental conditions, and observe safety procedures to avoid accidents during lifting.

#### **Describe the Rigger's Role in Load Preparation and Guiding Lifts**

The rigger's role includes preparing the load for lifting, selecting the appropriate rigging equipment, and ensuring that the load is securely attached to the crane. They also inspect the rigging gear, calculate load capacities, and guide the load during the lift to ensure stability and safety. Riggers are important to ensure that the lift is completed without incident while communicating with the crane operator and other team members to coordinate the safe movement of the load.

#### **Identify the Role of the Rigging Supervisor in Overseeing Rigging Activities and Ensuring Team Coordination**

The Rigging Supervisor oversees all rigging activities and is responsible for ensuring that the rigging team follows safety protocols, uses appropriate equipment, and works together efficiently. The supervisor coordinates between crane operators, riggers, and safety inspectors, ensuring that everyone understands their role and responsibilities. They are also responsible for conducting safety briefings, identifying potential hazards, and ensuring compliance with safety regulations throughout the rigging and lifting operation.

### **2.3.8. Exercise**

1. What is the primary role of the Crane Safety Inspector?
  - a) Operate the crane during lifting operations
  - b) Ensure compliance with safety standards and inspect crane equipment
  - c) Prepare the load for lifting
  - d) Direct the rigging team
2. What is one of the duties of a rigger during a lifting operation?
  - a) Guide the load during the lift
  - b) Operate the crane to perform the lift
  - c) Inspect the crane for mechanical issues
  - d) Ensure compliance with safety regulations
3. The Crane Safety Inspector is responsible for operating the crane during lifting operations. (T/F)
4. The crane operator is responsible for inspecting the rigging equipment before a lift. (T/F)
5. Before performing a lift, the \_\_\_\_\_ must inspect the crane, ensure the load capacity is within safe limits, and communicate with the rigging crew.
6. The \_\_\_\_\_ is responsible for selecting the appropriate rigging equipment, securing the load, and guiding it during the lift.
7. The \_\_\_\_\_ oversees the rigging team's activities, ensuring all rigging procedures are followed and that the lift is carried out safely.

## 2.4. Unit 2.3: Apply Safety Procedures in Lifting Operations

### 2.4.1. Unit Objectives

**At the end of this unit, students will be able to**

- To complete pre operation checking of lifting tools and equipment
- To understand a lifting operation and PPE required hard hats, gloves, safety footwear, and fall protection
- To identify and describe some of the most common safety procedures applied on lifting operations; lockout/tagout procedures
- To supervise the lifting operations that are performed safely and to safety standards
- To demonstrate the use of communication tools

### 2.4.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 2.4.3. Say

- Describe about process of pre operation checking of lifting tools and equipment
- Describe about lifting operation
- Describe about safety procedures applied on lifting operations; lockout/tagout procedures
- Describe how to use communication tools during lifting operation

### 2.4.4. Explain

- Describe about process of pre operation checking of lifting tools and equipment
- Describe about lifting operation
- Describe about safety procedures applied on lifting operations; lockout/tagout procedures
- Describe how to use communication tools during lifting operation

### 2.4.5. Activity

Divide the class into small groups and provide each group with a list of equipment and a PPE inspection checklist.

Assign each group a specific type of equipment or PPE to inspect. The groups will perform the checks and identify any potential issues.

After inspecting, each group will demonstrate how they would address the issues (e.g., replacing damaged rigging equipment or reporting defective PPE).

After the activity, bring the class together and discuss the inspection results. Ask the students to share what they found and how they would resolve any identified issues. Emphasize the importance of addressing safety concerns before operations begin.

### 2.4.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions.

### 2.4.7. Summary

It therefore incorporates safety procedures within lifting operations so that there may be protection between workers and equipment. The objective is that lifting operations should be dealt with in such a manner as to minimize risks of accidents, injuries, or even equipment breakdown. Important safety procedures include safety checks before a lifting operation begins, personal protective equipment, safe procedures, which include lockout/tagout, monitoring compliance of safety standards, and effective communication.

#### **Pre-Operation Safety Checks**

Pre-operation safety checks are required before any lifting operation. This includes checking all the lifting equipment, such as cranes, rigging, and safety devices, to ensure that they are in good working condition. Pre-operation checks also include checking whether load limits, mechanical systems, and safety features are functioning properly. These checks help identify potential issues early, preventing accidents or equipment failures during the lift.

#### **Personal Protective Equipment (PPE)**

PPE is the most important feature of worker safety in lifting. PPE usage includes hard hats, gloves, safety footwear, and high-visibility clothing in preventing falling objects, electrical risk, and injury from moving machinery. Proper equipment of the correct PPE for workers reduces the probability of injuries and increases general safety.

#### **Safety Procedures**

Lifting operations must follow established safety protocols to mitigate risks. Common protocols include lockout/tagout procedures, which prevent the accidental release of hazardous energy during maintenance or repair work, and emergency control procedures that outline how to respond to unexpected incidents or hazards. Proper implementation of these protocols ensures that equipment is safe to operate and that workers are prepared to respond to emergencies.

#### **Monitoring Safety Compliance**

Monitoring compliance with safety standards and regulations is paramount during lifting operations. All team members should be in the right procedure and use the appropriate equipment, and they must always be aware of potential hazards. The regular process of checks and oversight reduces accidents and ensures that lifting operations meet industry standards. The result is that the chance of injury and operational disruption remains extremely low.

#### **Good Communication**

The heart of coordinating a lifting operation to keep it safe is clear and efficient communication. Effective use of communication tools such as radios and hand signals enables the team members to convey

important information quickly and correctly. Crane operators, riggers, and supervisors must be able to communicate clearly so that there will be no misunderstandings and that the lift can be executed efficiently and safely.

### 2.4.8. Exercise

1. What is the primary purpose of conducting pre-operation safety checks in lifting operations
  - a) To ensure the equipment is clean and presentable
  - b) To verify that all safety devices and equipment are functioning properly
  - c) To calculate the total weight of the load
  - d) To train new workers on equipment usage
2. Which safety protocol is designed to handle unexpected situations like equipment malfunction or personnel injury during a lift
  - a) Pre-operation safety checks
  - b) Lockout/tagout procedures
  - c) Emergency control procedures
  - d) Regular maintenance schedules
3. Lockout/tagout procedures are used to prevent the accidental activation of equipment during maintenance or repair. (T/F)
4. During lifting operations, compliance with safety standards is optional and can be overlooked if the team is experienced. (T/F)
5. Personal protective equipment (PPE) such as \_\_\_\_\_ and \_\_\_\_\_ protect workers from falling objects and electrical hazards during lifting operations.
6. The \_\_\_\_\_ procedure is used to prevent the accidental release of hazardous energy during maintenance or repair work on lifting equipment.

## 3. Unit 3 NOS 2: SSD/N0328 v1.0 : Crane Operational Mechanisms and Systems

### 3.1. Key Learning Outcomes

- Understand the operational mechanisms of different types of cranes (e.g., mobile, tower, overhead cranes).
- Hydraulic, mechanical, and electrical systems related to the crane operations.
- Identify crane system faults and anomalies.
- Safety requirements, safety features, braking systems, and load indicators.
- Equipment maintenance to avoid downtime and accidents

## 3.2. Unit 3.1. Understand Mechanical and Structural Components

### 3.2.1. Unit Objectives

At the end of this unit, students will be able to:

- Identify and describe the most important mechanical components of cranes, such as booms, hooks, slings, and gears, and understand their roles in crane operations.
- Explain how various boom types- for example, telescopic or articulated-affect crane performance and operation efficiency while adapting to changing lifting tasks.
- Comprehend the application of counterbalance for maintaining stable operation and anti-tip in the lifting operation
- Discuss how that application ensures the safety of cranes.

### 3.2.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 3.2.3. Say

- Describe about mechanical components of cranes
- Describe about boom types and its component
- Describe about application of counterbalance for maintaining stable operation and anti-tip in the lifting operation
- Describe about safety of cranes

### 3.2.4. Explain

- Describe about mechanical components of cranes
- Describe about boom types and its component
- Describe about application of counterbalance for maintaining stable operation and anti-tip in the lifting operation
- Describe about safety of cranes

### 3.2.5. Activity

Divide the class into small groups. Assign each group a type of crane boom (e.g., telescopic, articulated, lattice, etc.).

Each group should discuss the advantages and disadvantages of their assigned boom type in relation to lifting tasks and operation. They should consider factors such as reach, flexibility, and load capacity. After the discussion, ask each group to present their findings to the class, emphasizing how different boom types affect crane operations.

### 3.2.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.

- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 3.2.7. Summary

#### **Booms, Hooks, Slings, and Gears**

The long arms extending from the bottom of the crane support the load.

Hooks are used in attaching the load to the crane.

Slings refer to ropes or chains used to attach the load to the hook to ensure the proper lifting of the load.

Gears refer to the mechanical parts of the crane that regulate the movements of the crane in terms of boom raising and lowering and the rotation.

#### **Boom Types and Its Effects on Operations**

Cranes also vary depending on the boom type, including telescopic and articulated booms.

Telescopic booms have segments that can be extended to stretch the distance and height the crane reaches, thereby making them versatile for a range of tasks.

Articulated booms have jointed sections that make it easier to manoeuvre in tight spaces. The boom type affects the operation of the crane, its lifting capacity, and how efficiently a task is accomplished.

#### **Counterweights and Crane Stability**

Counterweights balance the crane, meaning that it should not tip as one operates to lift with it.

Counterweights stabilize the crane on the side opposite the load, making sure that when lifting heavy weights, they may be raised without tipping or falling. Proper placing of counterweights must be made to maintain the centre of gravity of a crane and ensuring safety.

### 3.2.8. Exercise

#### **1. Which of the following components is responsible for connecting the load to the crane?**

- Boom
- Gear
- Hook
- Sling

#### **2. Which of the following is a key function of counterweights in a crane?**

- To increase the lifting capacity of the crane
- To ensure the crane does not tip over during lifting
- To improve the crane's fuel efficiency
- To allow the boom to rotate

3. A sling is used to attach the crane's hook to the load. (T/F)

4. Telescopic booms are fixed in length and cannot be extended or retracted. (T/F)

5. Counterweights help to prevent crane tipping by balancing the load being lifted. (T/F)

6. A \_\_\_\_\_ boom can extend and retract, providing greater reach and versatility for lifting operations.

7. The purpose of \_\_\_\_\_ in cranes is to ensure stability by balancing the load and preventing tipping during lifting operations.

## **3.3. Unit 3.2. Understand Hydraulic and Electrical Systems**

### **3.3.1. Unit Objectives**

**At the end of this unit, students will be able to:**

- Understand how hydraulic systems work to enable the movement of a crane in operations
- Understand how to identify the origin of fluid power as force and motion, enabling a crane to perform different movements.
- Identify and describe the essentials of the electrical components.
- Understand how to detect and troubleshoot common malfunctions that can occur in the hydraulic as well as electrical systems of cranes..

### 3.3.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 3.3.3. Say

- Describe about how hydraulic systems work to enable the movement of a crane in operations
- Describe about how to identify the origin of fluid power as force and motion, enabling a crane to perform different movements
- Describe about electrical components of crane
- Describe about how to detect and troubleshoot common malfunctions in cranes

### 3.3.4. Explain

- Describe about how hydraulic systems work to enable the movement of a crane in operations
- Describe about how to identify the origin of fluid power as force and motion, enabling a crane to perform different movements
- Describe about electrical components of crane
- Describe about how to detect and troubleshoot common malfunctions in cranes

### 3.3.5. Activity

Divide the class into small groups and give each group a diagram of a hydraulic crane system. Each diagram should have blank spaces where components should be labelled. Provide the groups with a list of components to identify (e.g., pump, cylinders, control valves, hoses, etc.).

Groups will work together to correctly identify and label all components on their hydraulic system diagram. Encourage them to refer to the lecture notes or their handouts to match the components with their functions.

### 3.3.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.

- Ensure that every participant answers all the questions

### 3.3.7. Summary

#### Hydraulic Systems

Hydraulic systems are vital for crane operation. They are made to apply pressure through pressurized fluid to produce force and movement. Major components of hydraulic systems within cranes are hydraulic pumps, cylinders, control valves, and fluid reservoirs. The hydraulic pump creates the pressure, which then travels with the fluid into the cylinders so that the crane can lift or lower heavy loads. These valves guide the hydraulic fluid flow, hence allowing the operator to control crane movement with considerable accuracy. Hydraulic systems can generate powerful forces in relatively compact packages, making them ideal for applications such as heavy-duty lifting and positioning of heavy objects.

#### Electrical Systems

Various controls and movements take place with electricity in the machinery of a crane. Such aspects contribute mainly to ensuring cranes' efficient and safe execution and performance. It is dominated with control systems and motors. Various sensors, usually connected with specific relays through which these signals reach, add to it all. In conclusion, motors act as sources providing power to implement various mechanisms-including rotation around the arm on a crane. Sensors are used to give feedback to the control system so that the crane's position, load weight, and other critical parameters can be monitored precisely. Relays and wiring help regulate the flow of electricity and ensure the proper operation of these components.

#### Malfunctions and Troubleshooting

Like any other complex machine, hydraulic and electrical systems of cranes are prone to malfunctions. The hydraulic system may leak fluids, lose pressure, or become contaminated, reducing the efficiency of the system and causing erratic movements. Electrical issues may include faulty sensors, motor failure, or wiring problems, which can interfere with the proper functioning of the crane. The malfunctioning of such equipment requires a systematic approach in the form of diagnostic tools such as pressure gauges for hydraulics and multimeters for electrical circuits. Proper maintenance and monitoring are essential to detect and address potential issues before they lead to equipment failure, ensuring the crane remains operational and safe.

### 3.3.8. Exercise

1. What is the primary function of a hydraulic pump in a crane's hydraulic system?
  - a) To provide power to the electrical components
  - b) To generate fluid pressure for lifting and lowering the load
  - c) To control the flow of electrical signals
  - d) To regulate the speed of crane movements
2. In an electrical system of a crane, which component is responsible for converting electrical energy into mechanical movement?
  - a) Motor
  - b) Sensor
  - c) Valve
  - d) Pump

3. True or False: The control system in a crane's electrical system is responsible for regulating the hydraulic fluid pressure.
4. True or False: Faulty wiring in the electrical system can cause the crane to operate erratically or fail to start.
5. In a crane's hydraulic system, \_\_\_\_\_ control the direction and flow of the hydraulic fluid, allowing the crane to lift, lower, and extend its arm.
6. The \_\_\_\_\_ system in a crane consists of components like motors, sensors, and control panels that enable precise control of the crane's movements.

### 3.4. Unit 3.3. Apply Knowledge of Safety Mechanisms

#### 3.4.1. Unit Objectives

**At the end of this unit, students will be able to:**

- Understand braking systems of crane
- Understand safety features of cranes
- Understand how these features prevent accidents, protect both the crane and the operator, and ensure the safe handling of loads.
- Understand use of load indicators and load charts
- Understand how to interpret and apply load charts in real-time crane operations so that the crane works within its safe working limits.

#### 3.4.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

#### 3.4.3. Say

- Describe about braking systems of crane and safety features of cranes
- Describe how these features prevent accidents, protect both the crane and the operator, and ensure the safe handling of loads
- Describe about use of load indicators and load charts
- Describe how to interpret and apply load charts in real-time crane operations so that the crane works within its safe working limits.

#### 3.4.4. Explain

- Describe about braking systems of crane and safety features of cranes
- Describe how these features prevent accidents, protect both the crane and the operator, and ensure the safe handling of loads
- Describe about use of load indicators and load charts
- Describe how to interpret and apply load charts in real-time crane operations so that the crane works within its safe working limits.

### 3.4.5. Activity

Divide the class into small groups. Provide each group with diagrams of crane braking systems, anti-two-block systems, and load charts. Have each group work together to:

Identify and label the key components of the braking system.

Explain how the anti-two-block system functions and why it is important.

Interpret a load chart and identify the crane's safe lifting capacity based on different configurations (boom length, angle, load radius, etc.).

Group Discussion

After the group work, ask each group to present their findings to the class. Discuss:

How does the braking system prevent unintended movement, and what could happen if it fails?

What are the consequences of not using an anti-two-block system or limit switches in crane operations?

How can load charts be used to prevent crane overload and ensure the safe handling of loads?

### 3.4.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 3.4.7. Summary

Safety mechanisms in cranes are basic elements that facilitate preventing accidents; therefore, using such mechanisms provides efficiency in running the operations along with safety issues both for personnel and equipment involved. This will cover some of the safety features within cranes by using braking systems, anti-two-block systems, limit switches, and load indicators.

#### Braking Systems

Braking systems are very necessary in the movement of a crane, especially in preventing unintended motion when lifting, lowering, or positioning a load. It puts to use mechanical, hydraulic, or electric brakes to stop or slow down the crane movement to position itself and avoid accidents. The braking system must be operated properly in the handling of cranes as it may be suspended in case the load has been lifted or the crane is in transit.

#### Safety Features

Cranes are fitted with safety features such as anti-two-block systems and limit switches.

Anti-two-block systems are designed to prevent the crane's hook from meeting the block, which can cause damage to the crane's structure or create hazardous situations.

Limit switches guarantee that the boom does not swing beyond its designated limits (in terms of boom angle, boom extension, or boom height). This way, mechanical failure or movement in unsafe situations is avoided. These features add on to operational safety by automatically limiting common hazards.

#### Load Indicators and Charts

Load indicators and load charts help a crane monitor capacity in terms of loading, making sure the crane does not get over its load-bearing limits. Load charts define crane safe-lifting capacity under various parameters: boom length, radius of loading, and configuration of boom. It means the weight of the payload lifted is kept continuously monitored while ensuring that a crane does not work beyond the established safe lifting capacity.

### 3.4.8. Exercise

1. What is the primary function of a crane's braking system?

- a) To provide power for lifting the load
- b) To prevent unintended movement and stop the crane

- c) To monitor load capacity
- d) To control crane speed
2. Which safety feature prevents the crane's hook from meeting the block?
- a) Load indicator
- b) Anti-two-block system
- c) Limit switch
- d) Brake system
3. What happens if a crane is overloaded according to its load chart?
- a) The crane will operate more efficiently
- b) The crane may become unstable and fail
- c) The crane's brakes will automatically engage
- d) The crane will speed up to compensate
4. True or False: Anti-two-block systems prevent the crane's hook from exceeding the load capacity limit.
5. True or False: Limit switches are used to ensure that the crane does not exceed pre-set safe operational limits, such as boom height or angle.
6. \_\_\_\_\_ switches are safety features that ensure the crane does not exceed its operational limits, such as height, angle, or extension.
7. Cranes are equipped with \_\_\_\_\_ charts that provide crucial information about the crane's safe lifting capacity based on different configurations.

### **3.5. Unit 3.4. Ensure Routine Maintenance and Fault Detection**

#### **3.5.1. Unit Objectives**

**At the end of this unit, students will be able to:**

- To identify common faults in hydraulic, mechanical, and electrical systems to troubleshoot, diagnose the source, and carry out corrective action that restores the function of a crane.
- To ensure efficient and safe crane operation.
- To conduct routine checks, perform preventive maintenance, and make sure that all systems are serviced properly to avoid malfunction.
- Understand how to maintain proper maintenance logs, record faults, and communicate faults to the right people.

#### **3.5.2. Resources to be used**

- Available objects such as Projection screen, whiteboard, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Attendance sheet
- Activities (role plays and games)

#### **3.5.3. Say**

- Describe about common faults in hydraulic, mechanical, and electrical systems to troubleshoot
- Describe about safe crane operation process

- Describe how to conduct routine checks, perform preventive maintenance
- Describe how to maintain proper maintenance logs, record faults, and communicate faults to the right people.

#### 3.5.4. Explain

- Describe about common faults in hydraulic, mechanical, and electrical systems to troubleshoot
- Describe about safe crane operation process
- Describe how to conduct routine checks, perform preventive maintenance
- Describe how to maintain proper maintenance logs, record faults, and communicate faults to the right people.

#### 3.5.5. Activity:

Introduce participants to a sample maintenance log or fault report form. Show them how to properly document routine maintenance tasks (e.g., checking fluid levels, inspecting cables, etc.) and any faults they detect.

Provide a scenario where students need to document a fault and report it:

The group will fill out a fault report detailing the diagnosis, actions taken, and the recommended follow-up.

The report should also include information such as the crane's model, system involved, and any tools or parts used in the troubleshooting.

Reporting Faults to Personnel

Discuss the process of reporting faults to appropriate personnel, whether it's a supervisor, maintenance team, or crane operator. Explain the importance of clear and accurate communication, especially when it comes to critical faults that could affect crane safety and performance.

#### 3.5.6. Notes for Facilitation

- Revise the important points discussed in this unit.
- Clear the doubts of the students, if any. Encourage them to ask questions.
- Discuss the question with the class and answer their queries satisfactorily.
- Help participants identify how to apply the skills taught in the course to their work
- Praise participants and the group on improving their performance and developing new skills.
- Encourage participants to move through the initial difficulties of learning new skills, by focusing on steps in their progress and the importance of what they are learning to do.

#### 3.5.7. Summary

##### **Basic Troubleshooting Hydraulic, Mechanical, and Electrical Faults**

Basic troubleshooting is an important skill for crane operators and maintenance personnel. This involves systematically identifying and diagnosing faults in the crane's hydraulic, mechanical, and electrical systems. Some of the common faults could be loss of hydraulic pressure, mechanical wear or noise, or electrical faults affecting control systems. Troubleshooting prevents further damage, reduces downtime, and ensures safe crane operations by taking care of problems early.

##### **All systems must be maintained according to guidelines by the manufacturer**

Regular maintenance of crane systems, based on manufacturer's guidelines, is required for ensuring their proper long-term performance. Such guidelines include detailed instructions concerning scheduled checks, fluid levels, inspections, and part replacements. In this respect, conducting such

processes will ensure the crane is always under its best state, reduces break down chances and also increases its equipment life cycle. Preventive maintenance also leads to safety aspects because the crane is operating with given limits while efficiently performing tasks.

### **Maintain documents and report fault conditions to competent persons**

Documentation and communication are essential elements in fault detection and routine maintenance. Maintenance logs should be up-to-date and should reflect all the inspections, repairs, and faults that have appeared throughout the operating process. The presence of any fault triggers timely and accurate reporting of the defect to all involved parties, such as supervisors, maintenance teams, and operators. Clear and concise reports will always help solve the problem timely and accurately to keep safety and operations in tact.

### **3.5.8. Exercise**

1. What is the primary purpose of troubleshooting in crane operations?

- To replace all parts of the crane
- To identify and fix faults in the crane's systems
- To increase the crane's lifting capacity
- To improve the crane's speed

2. Why is it important to follow the manufacturer's maintenance guidelines?

- To increase crane speed
- To ensure the crane operates safely and efficiently
- To reduce the crane's lifting capacity
- To minimize operating hours

3. True or False: Troubleshooting helps identify problems early, reducing the risk of a crane malfunction.

4. True or False: It is not necessary to follow the manufacturer's maintenance guidelines as long as regular maintenance is performed.

5. To ensure the crane operates safely, it is essential to maintain the systems according to the \_\_\_\_\_ guidelines.

6. When a fault is detected in the crane, it should be \_\_\_\_\_ to the appropriate personnel for timely action.

## **4. Unit 4 NOS 3: SSD/N0329 v1.0 : Inspection, Maintenance, and Certification of Lifting Equipment**

### **4.1. Key Learning Outcomes**

At the end of this module, the trainees will be able to

- **Conduct pre-operation and scheduled inspections of lifting equipment.**
- **Perform maintenance activities according to manufacturer guidelines.**
- **Identify and report defects, malfunctions, and non-compliance.**
- **Ensure certification and testing documentation is valid and up-to-date.**
- **Coordinate with technicians and operators to ensure proper equipment functionality**

## 4.2. Unit 4.1: Conduct Pre-Operation and Scheduled Inspections

### 4.2.1. Unit Objectives

At the end of this unit, students will be able to:

- To carry out adequate visual inspections so that all crane components,.
- Understand the critical role of safety devices and indicators in crane operation.
- To Check all lifting gears
- To point out any signs of fraying, corrosion, or damage that may compromise safety during lifting operations.

### 4.2.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 4.2.3. Say

- Describe about process of visual inspections
- Describe about critical role of safety devices and indicators in crane operation
- Describe about how to Check all lifting gears.

### 4.2.4. Explain

- Describe about process of visual inspections
- Describe about critical role of safety devices and indicators in crane operation
- Describe about how to Check all lifting gears.

### 4.2.5. Activity

Divide the class into small groups and assign each group an inspection task. Each group will receive an inspection checklist that covers the following:

Crane Components: Visual inspection of the crane's structure for signs of wear, cracks, rust, or other damages.

Safety Devices: Check if limit switches, warning lights, and other safety indicators are operational.

Lifting Gear: Check slings, hooks, ropes, pulleys, and other lifting equipment for damage or excessive wear.

Instructions:

Each group will conduct a visual inspection of their assigned crane components or equipment.

They will use the inspection checklist to identify any signs of damage or malfunction and record their findings.

If possible, groups will inspect real or simulated crane parts, such as model pulleys, hooks, or safety lights, to spot damage.

### 4.2.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.

- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions.

#### 4.2.7. Summary

Routine inspections and safety check of the component parts of equipment are important steps in crane operation to ensure the safety and effectiveness of the task. This provides an opportunity for potential problems that may become catastrophic or cause accidents, and this encompasses visual inspection of different parts of the crane and checking the effective working of all safety devices together with checking that lifting gear is in good working condition.

#### **Visual Inspections of Appurtenances of Equipment for Wears and Damage**

Regular visual inspections on parts of crane equipment are considered important to determine that portion with wear, corrosion, or cracking, which may hinder its operation as well as compromise safety. The inspection includes cracking's or rusting out on the structure of the crane, mechanical parts, and hydraulic systems. Early discovery enables proper maintenance or repair, thereby preventing further damage and downtime.

#### **Safety devices and safety indicators shall operate.**

Safety devices and indicators are integral components of the operation of a crane. Limit switches, warning lights, load indicators, and alarms are some of the basic requirements to ensure proper crane operation. Hazardous situations may result from faulty safety devices. Such situations could include failure to raise an alarm when a hazard might be building up, or to inhibit dangerous movement in a given area. The check and maintenance of these safety devices ensure that the safety standards remain high during crane operation.

#### **Inspect the condition of slings, hooks, pulleys, ropes, and other lifting gear**

Lifting gear comprises slings, hooks, pulleys, and ropes, which all experience wear and stress when in use with cranes. All these parts must be inspected for signs of damage such as fraying, corrosion, cracking, or other forms of deterioration. Routine inspection of lifting gear ensures it is safe for use and able to carry the loads required without failure, minimizing the chances of accidents or equipment failure during lifting operations.

#### 4.2.8. Exercise

1. Which of the following is an essential part of a visual inspection of crane equipment?
  - a) Checking the colour of the crane
  - b) Identifying signs of wear, cracks, or corrosion
  - c) Repainting the crane
  - d) Testing the crane's speed
2. When inspecting lifting gear, which of the following should be checked for damage?
  - a) Only the colour of the rope
  - b) The condition of slings, hooks, pulleys, and ropes
  - c) The number of people in the work area
  - d) The operator's schedule

3. True or False: Visual inspections should only focus on the crane's appearance, not on its mechanical or safety components.

4. True or False: Safety devices like limit switches and warning lights are essential for crane operation and should be regularly checked to ensure they are functional.

5. It is essential to ensure that all \_\_\_\_\_ devices, such as limit switches and alarms, are functioning properly before crane operation.

6. During lifting gear inspection, components like \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ should be checked for damage.

### 4.3. Unit 4.2: Perform Routine Maintenance and Repairs

#### 4.3.1. Unit Objectives

At the end of this unit, students will be able to:

- To perform routine and preventive maintenance tasks to ensure the crane operates at peak efficiency and within the recommended safety standards.
- To understand how to detect and diagnose minor faults in crane systems,
- To be able to perform basic repairs
- To collaborate effectively with maintenance teams for more significant repairs and replacements.

#### 4.3.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

#### 4.3.3. Say

- Describe about routine and preventive maintenance
- Describe about how to detect and diagnose minor faults in crane systems
- Describe about how to perform basic repairs

#### 4.3.4. Explain

- Describe about routine and preventive maintenance
- Describe about how to detect and diagnose minor faults in crane systems
- Describe about how to perform basic repairs

#### 4.3.5. Activity

Divide the class into small groups (3-4 participant per group).

Assign each group a specific task: routine maintenance, minor fault identification and repair, or coordinating a major repair.

Provide each group with a set of manufacturer's maintenance guidelines, tools, and equipment (model crane or diagram).

Groups will spend time performing their assigned tasks. Instructors will walk around to guide them, answer questions, and ensure tasks are performed according to guidelines.

Encourage learners to focus on proper documentation and communication, especially for fault reporting and repair coordination.

#### 4.3.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions.

#### 4.3.7. Summary

Proper crane maintenance and fault management are important steps to ensure the safe and efficient operation of lifting equipment. Minor faults shall be obtained by the operators and technicians by following manufacturer's guidelines; scheduling coordination will be done with the maintenance teams for major repairs.

##### **Maintenance activities shall be performed according to manufacturer's guidelines**

Maintenance activities are crucial to the longevity and safety of cranes. Adherence to the manufacturer's maintenance schedule ensures that the crane runs efficiently and safely. Routine inspections, lubrication, fluid changes, parts replacement, and routine safety checks are all included in these guidelines. Implementing them reduces the chances of premature wear and breakdown and extends the period of operation for the crane.

##### **Detect Minor Faults and Perform Routine Repairs**

The identification of small faults will prevent the equipment from malfunctioning and thus from getting damaged. A technician should identify early signs of wear and tear or malfunctions such as leakages, worn-out seals, or electrical malfunctions. It is easier to make minor, corrective repairs in a few seconds, such as replacing seals, tightening bolts, or recalibrating systems, in order to keep the crane running and prevent long periods of idleness. Faults identified in good time also mean the crane remains safe to use.

##### **Coordinate with Maintenance Teams for Major Repairs and Replacements**

Coordination with the specialized maintenance teams is required in case of major faults that cannot be corrected by minor repairs. Major faults may include hydraulic systems failure, structural damage, or failure of critical components. Such problems require reporting to the relevant maintenance personnel by crane operators or technicians for prompt proper repairs or replacement and possible reduction in downtime. Proper communication and coordination with maintenance teams help maintain safety, reduce operational disturbances, and prolong the life of the crane.

#### 4.3.8. Exercise

1. Which of the following is a key component of performing maintenance activities according to the manufacturer's guidelines?

- a) Replacing parts randomly
- b) Following the recommended maintenance schedule and procedures
- c) Ignoring minor faults until they become major issues
- d) Performing maintenance only when the crane stops working

2. When should an operator coordinate with maintenance teams for major repairs?

- a) When there is a minor fault
- b) When the crane is operating normally
- c) When the fault cannot be fixed with simple repairs and is critical to crane operation
- d) When the crane is scheduled for a routine check-up

3. True or False: Minor faults should be ignored until they result in major malfunctions that cause the crane to stop working.

4. True or False: Coordination with maintenance teams is only necessary for routine maintenance tasks.

5. Minor faults, such as \_\_\_\_\_ or \_\_\_\_\_, should be identified and repaired during routine maintenance to prevent more serious issues.

6. When a fault cannot be fixed with simple repairs and is critical to crane operation, it is necessary to \_\_\_\_\_ with the appropriate maintenance team for major repairs or replacements.

## **4.4. Unit 4.3. Ensure Certification and Compliance**

### **4.4.1. Unit Objectives**

At the end of this unit, students will be able to:

- **To understand and apply national and international safety standards, including OSHA and LOLER**
- **To be able to verify whether crane equipment complies with such safety standards so that all the safety regulations for safe crane operation are met.**
- **To verify the validity of testing certificates for crane equipment and ensure that all maintenance records are current and available.**
- **Understand how to prepare the necessary documents that would aid regulatory bodies to pass audits and gain certifications.**

### **4.4.2. Resources**

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### **4.4.3. Ask**

- Describe about national and international safety standards, including OSHA and LOLER
- Describe how to verify whether crane equipment complies with safety standard
- Describe process to verify the validity of testing certificates for crane equipment
- Describe how to prepare the necessary documents that would aid regulatory bodies to pass audits and gain certifications

### **4.4.4. Explain**

- Describe about national and international safety standards, including OSHA and LOLER

- Describe how to verify whether crane equipment complies with safety standard
- Describe process to verify the validity of testing certificates for crane equipment
- Describe how to prepare the necessary documents that would aid regulatory bodies to pass audits and gain certifications

#### 4.4.5. Activity

Divide participant into small groups (3-4 people per group). Provide each group with a sample crane or lifting equipment compliance checklist based on OSHA and LOLER guidelines.

Each group will review the sample crane or lifting equipment, checking that it meets the relevant safety standards. They will use the compliance checklist to verify whether the crane meets requirements like:

Proper load testing certification

Safety features (e.g., limit switches, emergency stops)

Inspection tags or labels for safety checks

Participant will identify if there are any missing components or deficiencies in compliance and make note of them.

#### 4.4.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions.

#### 4.4.7. Summary

The most important thing in maintaining crane safety, operational efficiency, and compliance with legal requirements is ensuring certification and compliance. This involves checking whether equipment adheres to national and international safety standards, having valid testing certificates and maintenance records, and preparing the necessary documentation for audits and certifications.

#### **Verify Equipment Compliance with National and International Safety Standards (e.g., OSHA, LOLER)**

It is always essential to guarantee that all cranes and lifting equipment used are fit and safe with regards to specified standards, and they must be proved in accordance to the set standards provided by OSHA and LOLER. This therefore implies that complying with these sets of standards demands scheduled inspections and certification and functional safety features with proper working abilities.

#### **See to It that Valid Test Certificates on File and Service Records Available**

valid test certificates and service records available are also essential in determining that equipment had been subjected to proper and regular inspection, maintenance; these show that loads witnessed have passed tests to meet necessary testing requirements, such as load tests placed on the same equipment that witnessed testing for general performance. These records are updated and easily accessible, which helps in maintaining operational safety and ensures that the crane is ready for audits or inspections at any time.

### Prepare Documentation for Audits and Certifications as Required

A series of compliance lay down the steps for preparation related to comprehensive documentation: laying down an inspection report test certificate, maintenance check, and keeping a record on safety checks; all these to be done in an arrangement for easy audit and review in times of certification. Such evidence of records proof that crane equipment meets all legality and safety check requirements and makes auditing seamless and efficient, thus easy renewals of any certification are always in place; this will enhance compliance with various safety standards that have to be followed.

#### 4.4.8. Exercise

1. Which of the following safety standards is commonly applied to crane operations?
  - a) OSHA (Occupational Safety and Health Administration)
  - b) ISO 9001
  - c) ANSI
  - d) ILO
2. What is the primary purpose of testing certificates for crane equipment?
  - a) To indicate the crane's color and size
  - b) To confirm that the equipment meets safety and operational standards
  - c) To check the lifting capacity of the crane
  - d) To record the crane's warranty details
3. True or False: Testing certificates and maintenance records are not required for crane equipment once it has passed initial inspections.
4. True or False: Audits and certifications ensure that crane equipment is operating according to established safety standards.
5. The purpose of testing certificates is to ensure that crane equipment has passed necessary \_\_\_\_\_ and meets safety regulations.
6. All testing certificates and maintenance records should be \_\_\_\_\_ and easily accessible for audits and inspections.

### 4.5. Unit 4.4. Report Defects and Non-Compliance Issues

#### 4.5.1. Unit Objectives

At the end of this unit, students will be able to:

- To accurately identify and document defects, faults, or non-compliance issues in crane equipment.
- To use appropriate documentation tools and formats to record issues
- To understand how to report, identified defects or non-compliances to supervisors, maintenance team, or any safety officer appropriately.
- To track the effectiveness of corrective actions implemented

#### 4.5.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart

- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

#### 4.5.3. Ask

- **Describe about how to identify and document defects, faults, or non-compliance issues in crane equipment**
- **Describe how to use appropriate documentation tools for recording issues**
- **Describe process to track the effectiveness of corrective actions implemented**

#### 4.5.4. Explain

- **Describe about how to identify and document defects, faults, or non-compliance issues in crane equipment**
- **Describe how to use appropriate documentation tools for recording issues**
- **Describe process to track the effectiveness of corrective actions implemented**

#### 4.5.5. Activity

Divide participant into small groups (3-4 people per group). Provide each group with a sample crane inspection checklist and a set of hypothetical scenarios (e.g., a worn-out sling, malfunctioning hydraulic pump, expired certification, or a broken limit switch). These scenarios should describe defects or faults that need to be documented.

Each group will examine the scenarios and identify the defects or non-compliance issues that need to be documented.

Using the provided defect reporting forms (either digital or paper), groups will document the issues, ensuring they include all relevant details, such as the nature of the defect, location, and any immediate actions taken (e.g., warning signs, temporary shutdown).

Each group will present their findings to the class, explaining how they documented the defects and why each issue was important to report. Discuss any challenges faced while identifying the issues and documenting them accurately.

#### 4.5.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions.

#### 4.5.7. Summary

##### **Documentation of Defects, Faults, or Non-Conforming Items**

Ensure that identified defects, faults, or nonconforming items are documented safely to ensure proper crane operation. For this, check the crane and its constituent parts for any form of wear and tear or damages and malfunctions. Whatever is mechanical, electrical, hydraulic, or pertaining to safety-related elements, they all need documentation which is correct and accurate. This involves recording the nature,

severity, and area of equipment affected by the defect. Proper documentation will help in creating a reliable record for corrective action and future reference.

### **Report Findings to Relevant Personnel for Corrective Action**

Once defects or issues of non-compliance have been recorded, these findings must be reported to appropriate personnel for corrective action. These persons may include supervisors, maintenance teams, safety officers, or others in a position to act. The report is thus clear, detailed, and timely to support the initiation of corrective actions. Channelled means of reporting and communication are essential for dealing with issues before they pose risks to crane operations' safety and efficiency.

### **Monitor and Follow Up on Corrective Actions to Ensure Compliance**

The final action towards defect and non-compliance issue management involves monitoring and following up on the corrective actions undertaken. This includes tracing whether issues that had been raised have been resolved and ensuring that the crane has met the safety standards. Follow-up ensures that all corrective actions are undertaken as required and that the equipment is safe to operate. Through constant monitoring and documentation of the resolution process, it inhibits various reemergent issues and maintains continuity in achieving compliance to safety regulations.

#### **4.5.8. Exercise**

1. What is the first step when handling a defect or non-compliance issue in crane operations?
  - a) Report the defect to management
  - b) Document the defect or issue
  - c) Perform corrective actions immediately
  - d) Wait for the issue to resolve itself
2. Who should defects or faults identified during crane inspections typically be reported to?
  - a) Only the crane operator
  - b) Relevant personnel such as supervisors, maintenance teams, or safety officers
  - c) The regulatory body
  - d) None of the above
3. True or False: It is important to follow up on corrective actions to ensure that they were completed properly and compliance is achieved.
4. True or False: The documentation of defects does not need to include the specific location or details of the issue.
5. After defects or faults are documented, the next step is to \_\_\_\_\_ them to relevant personnel for corrective action.
6. Monitoring and \_\_\_\_\_ on corrective actions helps ensure that the defect is properly resolved and compliance is maintained.

## **5. Unit 5 NOS 4: SSD/N0330 v1.0 : Legal and Regulatory Compliance for Lifting Operations**

### **5.1. Key Learning Outcomes**

- Application of national and international safety standards.

- Compliance with certification and operational guidelines.
- Lifting operations alignment with organizational safety policies.
- Documenting and reporting non-compliance issues.
- Preparation and management of regulatory audits and inspections.

## **5.2. Unit 5.1: Understand National and International Safety Standards**

### **5.2.1. Unit Objectives**

**At the end of this unit, students will be able to:**

- **To identify, interpret, and apply of relevant national and international standards on lifting operations**
- **To aware of the legal and safety considerations about lifting activities**
- **To understand how to communicate the regulatory requirement**

### **5.2.2. Resources**

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### **5.2.3. Ask**

- Describe about national and international standards on lifting operations
- Describe about legal and safety considerations
- Describe about how to communicate the regulatory requirement

### **5.2.4. Explain**

- Describe about national and international standards on lifting operations
- Describe about legal and safety considerations
- Describe about how to communicate the regulatory requirement

### **5.2.5. Activity**

Divide the class into small groups (3-4 participant per group)

Assign each group a specific safety standard to research in more detail (OSHA, LOLER, or ISO 45001).

Provide printed copies of the relevant sections of each standard or allow groups to use laptops/tablets to access the full standards online.

Ask each group to summarize their assigned standard in the following key areas:

Purpose of the standard

Key regulations for lifting operations or workplace safety

How the standard is enforced or monitored

Any penalties or legal consequences for non-compliance

### 5.2.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 5.2.7. Summary

#### Identify and Interpret Relevant National and International Standards

The national and international safety standards that need to be followed are OSHA, LOLER, and ISO 45001, which is an occupational health and safety management system. OSHA is the governing body for workplace safety in the United States, while LOLER is the governing body in the UK concerning the safety of lifting equipment and operations. ISO 45001 is the international standard for managing occupational health and safety risks in all industries. Professionals in the field of lifting operations should be able to identify, interpret, and apply these standards in the workplace to ensure safety.

#### Ensure Lifting Operations conform to Legal and Safety Standards

One of the significant responsibilities in lifting operations is compliance with national and international regulations. Monitoring of lifting operations by supervisors and safety officers is critical in ascertaining that everything on the equipment, from inspection to the conduct of operators, is legal and safe. Working within such standards decreases the chances of accidents, injuries, and machine malfunction that trigger unsafe working conditions.

#### Commeasurable Regulatory Requirements to Operational Teams

This would then require that proper communication of the regulatory requirements to the teams be in place. Safety managers and supervisors must make sure that every individual, whether in operation or in maintenance, follows the protocols by training, updated safety standards regularly, and having continuous feedback for safe practices. In this regard, if people know what to do and know how to follow standards, an organization can be guaranteed to be culturally safe and compliant.

### 5.2.8. Exercise

1. Which regulation governs the safety of lifting operations in the UK?
  - a) ISO 9001
  - b) LOLER
  - c) OSHA
  - d) NFPA 70E
2. Communicating regulatory requirements to operational teams is not important as long as the supervisors understand the safety standards.
3. OSHA (Occupational Safety and Health Administration) is an international safety standard.
4. LOLER (Lifting Operations and Lifting Equipment Regulations) is specifically applicable to the UK.
5. In the UK, the lifting operations and equipment are governed by the \_\_\_\_\_ regulations.
6. One of the key responsibilities of a safety officer is to \_\_\_\_\_ regulatory requirements to operational teams to ensure safe working practices.

## 5.3. Unit 5.2: Ensure Compliance with Organizational Safety Policies

### 5.3.1. Unit Objectives

At the end of this unit, students will be able to:

- To comply with organizational safety policies in lifting operations.
- To verify all procedures are aligned with organizational safety protocols
- To ensure policies, procedures , and reporting of the issues related to non-compliance to the respective authorities.
- To understand important role in maintaining the organization with a safety culture that promotes safe and compliant lifting practices.

### 5.3.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 5.3.3. Ask

- Describe about procedures and safety protocols in lifting operations
- Describe about how to ensure policies, procedures , and reporting of the issues related to non-compliance to the respective authorities.
- Describe about important role of maintaining the organization with a safety culture that promotes safe and compliant lifting practices.

### 5.3.4. Explain

- Describe about procedures and safety protocols in lifting operations
- Describe about how to ensure policies, procedures , and reporting of the issues related to non-compliance to the respective authorities.
- Describe about important role of maintaining the organization with a safety culture that promotes safe and compliant lifting practices.

### 5.3.5. Activity

Divide the class into small groups and provide each group with a copy of the organization's lifting operation safety protocols.

Each group will go through the protocols and verify the following:

Ensure that all necessary procedures (e.g., risk assessments, equipment checks, operator qualifications) are covered.

Identify any gaps or areas that could potentially lead to non-compliance.

Groups will then present their findings to the class, discussing any discrepancies and offering suggestions for improvement or clarification.

### 5.3.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 5.3.7. Summary

#### **Check that All Procedures Adhere to Organizational Safety Policies**

First, the current lifting procedures of the organization must be verified to ensure that they are in line with the safety protocols. This would involve reviewing and confirming if all safety measures are followed constantly. Among these safety measures are proper inspection of equipment, operator training, and risk assessments. These lifting operations, carried out and audited, help verify the potential shortcomings with compliance so that there is zero tolerance for safety standards violations at any point in time.

#### **Monitor the lifting operations.**

The second step of the planning phase is the continuous monitoring, which ensures all lifting operations are carried out in a safe manner as outlined by the safety policies. Therefore, supervisors and safety officers are supposed to monitor the lifting operation and correct dangerous practices when necessary. This proactive intervention then becomes a preventive measure against accidents and ensures compliance with safety, hence a safety culture.

#### **Identify and Report Non-Compliance Issues**

Non-adherence to any safety procedure during any operation always presents some degree of non-compliance. It becomes very important for the supervisors as well as the safety officers concerned to be observant of these weaknesses and report the same to the authority concerned. In this case, non-adherence may include faulty use of machinery, non-obedience of safety procedure or lack of adequate training. Reportage of violation ensures corrective actions are taken before accidents occur in line with the prescribed safety standards.

### 5.3.8. Exercise

- 1.To ensure compliance with organizational safety policies, supervisors must \_\_\_\_\_ lifting operations to verify adherence to established safety protocols.
- 2.When a non-compliance issue is identified during a lifting operation, it should be \_\_\_\_\_ to the relevant authorities.
- 3.Verifying that all lifting procedures comply with organizational safety protocols is only necessary before starting the operation.(True/False)
- 4.It is the responsibility of safety officers and supervisors to actively monitor lifting operations and ensure that safety procedures are followed. (True/False)
- 5.Which of the following is the primary responsibility when ensuring compliance with organizational safety protocols during lifting operations?
  - a) Completing safety paperwork only

- b) Monitoring the lifting operation to ensure adherence to policies
  - c) Providing lifting equipment maintenance
  - d) Delegating safety responsibilities to operators
6. What is the role of a supervisor in verifying that lifting operations comply with safety protocols?
- a) To ensure equipment is properly used and operated by qualified personnel
  - b) To only inspect the equipment before the operation starts
  - c) To oversee the lifting operation and ensure that all safety protocols are being followed
  - d) To maintain records of lifting operations

## **5.4. Unit 5.3 Manage Certification and Documentation**

### **5.4.1. Unit Objectives**

**At the end of this unit, students will be able to:**

- To understand proper management of certification and documentation of lifting operations
- To understand how to ensure that all the equipment's certifications are up-to-date, maintain an accurate record of the audits, inspections, and certifications
- To understand how to prepare documentation for regulatory audits and internal review.

### **5.4.2. Resources**

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### **5.4.3. Ask**

- Describe about process of proper management of certification and documentation of lifting operations
- Describe about how to ensure that all the equipment's certifications are up-to-date, maintain an accurate record of the audits, inspections, and certifications
- Describe about how to prepare documentation for regulatory audits and internal review

### **5.4.4. Explain**

- Describe about process of proper management of certification and documentation of lifting operations
- Describe about how to ensure that all the equipment's certifications are up-to-date, maintain an accurate record of the audits, inspections, and certifications
- Describe about how to prepare documentation for regulatory audits and internal review

### **5.4.5. Activity**

Divide the class into small groups and give each group a set of sample lifting equipment certifications (both expired and current).

Each group is tasked with:

Verifying the equipment certification dates and comparing them with the current inspection and maintenance schedules.

Identifying any expired certifications or overdue safety inspections.

Ensuring that all documentation is consistent and up to date.

Ask each group to update their records and present a report to the class, explaining how they verified the certifications and what actions would need to be taken to address any discrepancies (e.g., scheduling inspections, renewing certifications).

#### 5.4.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

#### 5.4.7. Summary

##### **All equipment shall be certified and safety inspected**

Some of the critical tasks in maintaining certification include having valid certifications on all lifting equipment and conducting scheduled safety inspections that comply with requirements of safety regulation. Maintaining current certifications will ensure that all equipment is safe for use, complies with legal provisions, and further reduces the occurrence of accidents associated with lifting activities. In simple words, this would require one to set inspection dates, renew certifications, and correct whatever flaws are established within the recommended timeframe.

##### **Maintain proper documentation of audits, inspections, and certifications**

It's only through an accurate documentation system that the statuses of equipment certification, safety inspection, and auditing results can be monitored. As long as accuracy is maintained within the records, there is no safer lifting operation from outsiders' scrutiny or audit. Without improper documentation, appropriate access to record files for proper inspections and audit is not disturbed or inconvenienced, and inspection date, renewal, and audit outcomes are documented, and ready to be accessed when needed.

##### **Documenting for Regulatory Audits and Internal Reviews**

Preparing documents for both regulatory audits and internal reviews requires accuracy and precision. It ensures all the right documents are pulled together, like equipment certifications, inspection records, and audit reports, to complete an organized and cohesive package of documentation for both the auditors and the teams undertaking internal review. This assures proper preparation by being prepared to pass the required documentation that can guarantee an audit or help remain in regulatory compliance. It also involves identifying any issues that may arise in the audit process and addressing them before they become major concerns.

#### 5.4.8. Exercise

1. What is the primary responsibility of a safety officer in managing equipment certifications?

- a) Ensure that equipment is only inspected annually
- b) Ensure that all equipment certifications and safety inspections are up to date
- c) Ensure operators are trained on the equipment
- d) Ensure equipment is used properly during operations

2. Why is it important to maintain accurate documentation of audits and inspections?

- a) To increase the cost of operations
- b) To ensure compliance and pass audits
- c) To avoid reporting incidents during operations
- d) To keep track of the financial records

3. It is important to ensure that equipment certifications and safety inspections are always up to date to comply with safety regulations. (T/F)

4. Accurate documentation of audits, inspections, and certifications is not necessary if all equipment is in good working condition. (T/F)

5. To comply with safety regulations, it is essential to ensure that all \_\_\_\_\_ and safety inspections for lifting equipment are up to date.

6. \_\_\_\_\_ documentation of audits, inspections, and certifications helps maintain compliance and ensures that lifting operations meet legal and safety standards.

## 5.5. Unit 5.4 Report Non-Compliance and Implement Corrective Actions

### 5.5.1. Unit Objectives

At the end of this unit, students will be able to:

- To equip learners with the skills and knowledge required to effectively identify, document, and report incidents of non-compliance in lifting operations.
- To understand how to implement corrective actions to address non-compliance and prevent future occurrences.
- To ensure safety and operational compliance through violation identification, proper documentation with notice to concerned parties and authorities.

### 5.5.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 5.5.3. Ask

- Describe about process of effectively identify, document, and report incidents of non-compliance in lifting operations.
- Describe about how to implement corrective actions to address non-compliance and prevent future occurrences.

- Describe how to ensure safety and operational compliance

#### 5.5.4. Explain

- Describe about process of effectively identify, document, and report incidents of non-compliance in lifting operations.
- Describe about how to implement corrective actions to address non-compliance and prevent future occurrences.
- Describe how to ensure safety and operational compliance

#### 5.5.5. Activity

Divide the class into small groups and give each group a scenario card describing a different non-compliance incident related to lifting operations. Examples of non-compliance incidents could include:  
Failure to inspect lifting equipment before use.

An operator using equipment without the proper certification.

Lifting a load that exceeds the equipment's weight limit.

Each group will:

Identify the specific non-compliance issue within the scenario.

Discuss potential risks and consequences of the identified non-compliance.

After discussion, each group will present their findings to the class, explaining the non-compliance and its implications.

#### 5.5.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

#### 5.5.7. Summary

##### **Document every instance of failure to comply**

First and foremost, management of non-compliance begins with an incident's identification where safety protocols, regulations, or organizational standards are not complied with. Inability to comply with non-compliance is manifested through many factors, like equipment misuse, absence of adequate inspections, and safety procedures being flouted. On identifying the same, the detail record of such incidents should include date, time, persons, and nature of the non-compliance. The problem will be documented appropriately, hence making it possible to review as part of taking corrective actions.

##### **Report Non-Compliance to Appropriate Personnel and External Authorities**

It is after recording the incident of non-compliance that it should be reported to appropriate personnel within the organization, like supervisors, safety officers, and managers, if necessary, external authorities, for example, OSHA. Reporting makes sure that the concerned people are notified so that something can be done about the matter of non-compliance. Also, it keeps the organization on the right path, transparently compliant with all legal and safety standards, perhaps avoiding penalties or worse.

### **An appropriate corrective action to correct and prevent recurrence of non-compliance**

Following identification and reporting of the problem on non-compliance, corrective action must be made. It should result in the resolution of the problem and prevents recurrence. There would be the immediate remedial action that can be made to correct the problem at hand and other long-term action for ensuring compliance. Corrective actions would therefore be like: the retraining of the employees; upgrading the procedures; improved equipment inspection or introducing new safety procedures. In such a way, remedial steps must be taken so that it maintains the workplace safe and no other kind of accident occurs again.

#### **5.5.8. Exercise**

1. What is the first step in managing an incident of non-compliance in lifting operations?
  - a) Report the incident to the authorities immediately
  - b) Identify and document the non-compliance
  - c) Implement corrective actions
  - d) Ignore the incident if it's minor
2. Who should be notified if a non-compliance incident is identified during lifting operations?
  - a) Only the employee involved
  - b) Appropriate internal personnel and external authorities if necessary
  - c) The public
  - d) No one, as long as it is fixed internally
3. It is important to document any incidents of non-compliance in order to ensure a proper record is maintained for future reference. (T/F)
4. Non-compliance incidents should only be reported to internal personnel and never to external authorities. (T/F)
5. The first step in managing non-compliance is to \_\_\_\_\_ and document the incident accurately.
6. Once a non-compliance incident is documented, it should be \_\_\_\_\_ to the appropriate personnel and external authorities, if necessary.

## **6. Unit 6 NOS 5 SSD/N0331 v1.0 : Hazard Identification, Risk**

### **Assessment, and Incident Reporting in Lifting Operation**

#### **6.1. Key Learning Outcomes**

- **Identify hazards related to crane and lifting operations.**
- **Conduct risk assessments to evaluate and prioritize risks.**
- **Implement preventive and corrective actions to reduce risks.**
- **Report incidents, near-misses, and safety violations effectively.**
- **Maintain incident records and ensuring corrective actions are documented.**

#### **6.2. Unit 6.1 Identify Hazards in Lifting Operations**

##### **6.2.1. Unit Objectives**

**At the end of this unit, students will be able to:**

- To identify, assess, and understand the possible risks associated with equipment and site-related factors in the case of crane operations
- To assess environmental factors, such as heavy winds or a lack of planed surfaces, on what would impact the lifts

- To trace equipment for any possible wear, defect, or breakdown that would likely cause danger and harm.
- To ensure safe operating for Lifting operation

### 6.2.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 6.2.3. Ask

- Describe about process how to identify, assess, and understand the possible risks associated with equipment
- Describe about environmental factors that affect lifting operation
- Describe about safe operating procedure for Lifting operation

### 6.2.4. Explain

- Describe about process how to identify, assess, and understand the possible risks associated with equipment
- Describe about environmental factors that affect lifting operation
- Describe about safe operating procedure for Lifting operation

### 6.2.5. Activity

Divide the class into small groups (3-4 participant per group).

Inspect a set of equipment images (or diagrams) for signs of wear and defects.

Identify risks associated with each defect (e.g., worn-out tires could reduce stability).

Discuss how to address these issues (e.g., replacing worn parts, conducting regular inspections).

### 6.2.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 6.2.7. Summary

Hazard identification will include identifying risks that are likely to be posed by the crane, equipment, and worksite. Mechanical hazards in cranes and equipment may result from failures in component parts, incorrect setup, and wear and tear. Site conditions such as uneven ground or obstacles create hazardous lifting environments. A good site assessment and crane inspection should highlight the potential risks.

Environmental Condition - This shows the impact environmental conditions like the effects of extreme wind, rainfall, or extremely high temperatures. The environmental factor can be extremely high winds may knock

the crane off balance with its load off-balance while wet or rough terrain will compromise a crane's ability to stabilize. If all these factors are recognized and altered the mode of operation according to these conditions, like stopping work when there is strong wind or wet condition, it will guarantee safety and accident-free. Lifting equipment's maintenance check-up for the identification of wear and damage. Checks are done in all the cranes as well as any lifting equipment it has for noticeable wear, damage, or defects that may inhibit its performance. Typical problems might be worn-out tires, damaged cables, broken hydraulics, or control systems not functioning properly. Detailed periodic inspection with the correction of early defects is highly important in the prevention of failure in the operation that causes an accident.

### 6.2.8. Exercise

1. Which of the following is a potential hazard when using cranes in a construction site?
  - a) Uneven surfaces
  - b) Low temperatures
  - c) Properly maintained equipment
  - d) Clear weather conditions
2. What should crane operators regularly inspect to ensure safety?
  - a) Only the crane's hydraulic system
  - b) Only the operator's training record
  - c) The crane's tires, cables, and hydraulic systems
  - d) The operator's uniform
3. Cranes should be operated on uneven surfaces only if the crane is equipped with outriggers. (T/F)
4. High winds have no effect on crane operations, and cranes can be safely operated in any weather conditions. (T/F)
5. Regularly monitoring crane components such as \_\_\_\_\_ and cables helps identify wear and prevent mechanical failures.
6. Inspecting crane \_\_\_\_\_ systems ensures that all hydraulic functions operate smoothly and safely.

## 6.3. Unit 6.2 Conduct Risk Assessments and Mitigate Hazards

### 6.3.1. Unit Objectives

**At the end of this unit, students will be able to:**

- To do effective risk assessments in identifying hazards in the workplace
- To assess the probability and probable impact of identified hazards in ranking risks
- To develop protective measures in control of identified risks for safety provision
- To communicate identified risks and their corresponding control measures to team members.

### 6.3.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.

- Activities (role plays)

### 6.3.3. Ask

- Describe about risk assessments process
- Describe about how to develop protective measures in control of identified risks
- Describe about how to communicate identified risks and their corresponding control measures to team members

### 6.3.4. Explain

- Describe about risk assessments process
- Describe about how to develop protective measures in control of identified risks
- Describe about how to communicate identified risks and their corresponding control measures to team members

### 6.3.5. Activity

Divide the class into small groups and give each group a scenario card detailing specific lifting operations. Examples of scenarios could include:

Operating a crane in high wind conditions.

Using lifting equipment with known wear on critical parts.

Lifting a load over uneven surfaces.

Each group will:

Identify the hazards present in the scenario.

Perform a risk assessment by evaluating the likelihood of each identified hazard and its potential impact.

Use the provided risk assessment templates for this.

Groups will fill out the assessment, rating the hazards based on likelihood (e.g., low, medium, high) and impact (e.g., minor, moderate, severe).

### 6.3.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 6.3.7. Summary

#### **Assess the risks with respect to the potential and consequences of known hazards**

The first step in risk management is identifying hazards in the workplace, whether it is a failure of equipment, environmental, or human. Once these hazards are identified, a risk assessment is performed, which evaluates the likelihood of the hazard occurring and the potential impact it could have on safety and operations. It allows for prioritizing hazards and focusing resources on addressing those that pose the greatest risk.

#### **Implement and establish preventive measures against risk.**

Following the identification and evaluation of risks, preventive measures to control the risks should be designed and implemented. These may include changes in work procedures, the use of safety equipment, regular maintenance, or training. The aim is to minimize the chances of hazards happening and their effects on workers, equipment, and operations. Preventive measures could be short-term or long-term; however, they should be realistic, feasible, and relevant to the identified risks.

#### **Discuss Identified Risks and Controls with Team Members.**

Effective communication of identified risks and control measures ensures that all members of the team are aware of potential hazards and know how to address them. It is of utmost importance that the results of risk assessments should be communicated so that preventive measures are outlined for everyone involved. This may be in the form of safety briefings, written instructions, signage, and many reminders so that the team is following safety protocols and ready to handle anything that comes up.

### **6.3.8. Exercise**

1. What is the primary purpose of performing a risk assessment?
  - a) To eliminate all hazards from the workplace
  - b) To determine the likelihood and impact of identified hazards
  - c) To assign blame for accidents
  - d) To evaluate employee performance
2. What is the most effective way to ensure team members are aware of the risks and control measures?
  - a) Only informing the team leader
  - b) Writing it down in the company manual
  - c) Communicating the risks and measures during team meetings and briefings
  - d) Posting the risks on a bulletin board
3. In risk assessments, which of the following factors must be considered when evaluating a hazard's impact?
  - a) The total number of employees present
  - b) The financial cost of the hazard
  - c) The potential harm to workers, equipment, and the environment
  - d) The time it takes to complete the task
4. Performing a risk assessment involves evaluating only the likelihood of a hazard, not its impact. (T/F)
5. Preventive measures should aim to eliminate hazards whenever possible, or at least reduce their potential impact. (T/F)
6. A risk assessment helps determine the \_\_\_\_\_ and \_\_\_\_\_ of potential hazards in the workplace.
7. Preventive measures should aim to \_\_\_\_\_ hazards or reduce their \_\_\_\_\_ to protect workers and operations.

## **6.4. Unit 6.3 Report Incidents and Near-Misses**

### **6.4.1. Unit Objectives**

**At the end of this unit, students will be able to:**

- To document and report incidents, near-misses, and safety violations effectively in line with organizational procedures and standards.
- To conduct thorough root-cause analyses that identify underlying factors contributing to incidents.

#### 6.4.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

#### 6.4.3. Ask

- Describe about process of document and report incidents, near-misses, and safety violations
- Describe about root-cause analyses

#### 6.4.4. Explain

- Describe about process of document and report incidents, near-misses, and safety violations
- Describe about root-cause analyses

#### 6.4.5. Activity

Divide the class into small groups (3-4 people per group).

Provide each group with a case study scenario involving an incident, near-miss, or safety violation.

Have each group complete an incident report using the provided templates, ensuring that all sections are filled out in accordance with organizational procedures.

Sections may include: Incident description, date/time, persons involved, immediate actions taken, severity, and corrective actions proposed.

Encourage the groups to consider:

Timeliness of the report.

Consistency with organizational standards.

Clarity and accuracy of the information.

#### 6.4.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

#### 6.4.7. Summary

**Report and document incidents, near-misses, and safety violation promptly.**

Indeed, it is therefore important to report incidents on time to address the issues involved. All incidents, near misses, and safety violations should be recorded at once as an account for what has happened,

trigger other further investigation measures, and institute corrective actions. Further exposure to risk, lack of responsibility, and lost opportunities to learn may result from delayed reporting.

**All employee incident reports should be similar to the organisational procedures and standards.**

Incident reports should follow the organization's specific procedures and standards. This would ensure consistency, accuracy, and compliance with legal and regulatory requirements. Standardized reporting allows easier tracking, analysis, and communication across departments, enhancing overall safety management and accountability.

**Root Cause Analysis of any incidents to discover the underlying reasons.**

This requires root cause analysis as soon as the incident is reported to know what precipitated the scenario. It's not about looking at the immediate cause, but rather something deeper in the system -- perhaps there was inadequate training, incorrect equipment, or poor communication. So, this analysis can guide how the organizations take corrective actions to avoid getting into such scenarios again in the future.

### 6.4.8. Exercise

1. Why is it important to report incidents and near-misses promptly?
  - a) To ensure compliance with organizational standards
  - b) To prevent further risks and enable corrective actions
  - c) To avoid legal consequences
  - d) All of the above
2. What is the purpose of conducting a root-cause analysis after an incident?
  - a) To assign blame to individuals
  - b) To identify underlying factors that led to the incident
  - c) To punish employees involved
  - d) To determine the cost of the incident
3. Incident reports must be \_\_\_\_\_ to ensure that they are documented in a timely and consistent manner according to organizational standards.
4. The process of identifying the underlying factors contributing to an incident is called \_\_\_\_\_.
5. In an incident report, it is important to document the \_\_\_\_\_ of the incident, such as date, time, and location, to ensure accuracy.

## 6.5. Unit 6.4 Maintain Records and Follow Corrective Actions

### 6.5.1. Unit Objectives

**At the end of this unit, students will be able to:**

- To record incidents and any corrective actions carried out with completeness and accuracy
- To the monitoring and ensuring the necessary action taken is conducted effectively
- To understand safety audit process

### 6.5.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc

- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 6.5.3. Ask

- Describe about process of record incidents and any corrective actions
- Describe about monitoring system
- Describe about safety audit process

### 6.5.4. Explain

- Describe about process of record incidents and any corrective actions
- Describe about monitoring system
- Describe about safety audit process

### 6.5.5. Activity

Divide the class into small groups (3-4 people per group).

Provide each group with a case study scenario involving an incident (e.g., equipment malfunction, workplace injury, or safety violation).

Ask each group to create a detailed incident report including:

Incident description, date/time, and location.

Individuals involved and any witnesses.

Immediate actions taken (e.g., first aid, reporting).

Corrective actions proposed to prevent future incidents.

Encourage groups to be thorough in documenting each detail, ensuring it aligns with organizational procedures

### 6.5.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 6.5.7. Summary

**Keep records of all incidents and remedial actions.**

These records are essential for proper safety management; they show a clear history of what happened, what was done in correcting the issue, and what prevented future recurrence. Proper documentation is necessary for accountability, compliance with safety regulations, and to identify trends in workplace hazards. This practice is important for continued safety improvement and serves as a reference in future audits or investigations.

**Monitor and verify the implementation of corrective measures**

Once corrective actions are identified and applied, these require monitoring and inspection to see that they have worked. Follow-up after a stipulated time will ensure that the right actions have indeed been undertaken and made sure that such actions do not recur again. There is even provision for adjustment at the monitoring end in case the corrective actions undertaken earlier were not good enough and some new risks have emerged. Verification check whether the measures employed are indeed in accordance with the safety measures meant and made according to the procedure laid down in an organization.

**Participate in the safety audits and provide feedback for improvement.**

People engage in safety audits to know how effective the measures are for safety and to ensure that any corrective actions taken have been followed through. Audits are a very structured way of identifying hazards, ensuring conformity with safety standards, and monitoring effectiveness in preventive measures. Active participation requires not only detecting weaknesses or gaps but contributing positively to continuous improvement. Ideas and suggestions help in developing a safer and more efficient working environment.

**6.5.8. Exercise**

1. What is the purpose of verifying the implementation of corrective measures?

- a) To ensure the corrective measures are being followed correctly
- b) To punish employees who did not follow safety procedures
- c) To delay the safety improvements
- d) None of the above

2. Which of the following is NOT a key element to be recorded in an incident report?

- a) Description of the incident
- b) Root cause analysis
- c) The personal opinions of the involved employees
- d) Corrective actions taken

3. What is a safety audit primarily designed to do?

- a) Identify and eliminate workplace hazards
- b) Increase the number of incidents reported
- c) Assign blame to individuals for incidents
- d) Ensure the safety equipment is purchased

4. Detailed records of incidents and corrective actions must be \_\_\_\_\_ to ensure they provide an accurate account of what happened and what measures were taken.

5. To ensure corrective actions are effective, they must be monitored and \_\_\_\_\_ regularly to verify that they are working as intended.

6. True or False: Maintaining detailed incident records is only required for serious incidents and not for near-misses or minor safety violations.

7. True or False: Participating in safety audits is important because it allows employees to help identify potential hazards and contribute to safety improvements.

## 7. Unit 7 NOS 6: SSD/N0332 v1.0 : Safety of Plant, Machinery, and Vehicle in Lifting Operation

### 7.1. Key Learning Outcomes

- Ensure safe operation of machinery, plant, and vehicles at work sites.
- Conduct inspections and maintenance to detect faults and malfunctions.
- Implement and monitor safety protocols to prevent accidents.
- Coordinate with operators, supervisors, and safety teams to ensure compliance.
- Manage vehicles, personnel, and equipment in dynamic environments.

### 7.2. Unit 7.1. Ensure Safe Operations of Plant, Machinery, and Vehicles

#### 7.2.1. Unit Objectives

At the end of this unit, students will be able to:

- To ensure the safe operation of plant, machinery, and vehicles at work sites.
- To monitor and assess the safe handling and operation of these equipment types by checking whether the operators are following the manufacturer's instructions for use together with established safety guidance.
- To ensure that all personnel are using the right PPE, thereby creating a culture of safety and compliance at the workplace

#### 7.2.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

#### 7.2.3. Ask

- Describe about process of safe operation of plant, machinery, and vehicles at work sites.
- Describe about process how to monitor and assess the safe handling and operation
- Describe about process to ensure that all personnel are using the right PPE

#### 7.2.4. Explain

- Describe about process of safe operation of plant, machinery, and vehicles at work sites.
- Describe about process how to monitor and assess the safe handling and operation
- Describe about process to ensure that all personnel are using the right PPE

#### 7.2.5. Activity

Divide the class into small groups (3-4 people per group).

Provide each group with a scenario card that describes a specific plant, machinery, or vehicle used on a worksite (e.g., operating a forklift in a warehouse, using a bulldozer on a construction site, or driving a delivery truck).

The group's task is to:

Review and identify the manufacturer's instructions and safety guidelines that must be followed for safe operation.

Check the PPE requirements for operators of that specific equipment, ensuring that appropriate gear (e.g., helmets, gloves, eye protection, etc.) is listed.

List the common hazards associated with operating that equipment and identify preventive measures.

### 7.2.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 7.2.7. Summary

It involves monitoring the handling and operation of plant, machinery, and vehicles so that these are handled in a safe and proper manner and according to safety standards set. Monitoring includes regular checking to ensure that the equipment is operating according to established safety standards, discovering potential hazards, and corrective action in these cases.

It describes the operator's obligation to follow the safety guides and the manufacturers' guidelines that are meant to ensure proper use of machinery, thus ensuring safety and also preventing breakdowns on equipment that makes the use of equipment efficient. Safety officers and the supervisors will ensure that there is the implementation of all such instructions during times of utilization in the factory premises.

It involves checking whether all personnel are using the appropriate personal protective equipment. Personal protective equipment is one of the most important factors in protecting the workers from hazards that may arise from operating heavy machinery and vehicles. Proper use of PPE, including hard hats, gloves, goggles, and hearing protection, helps to protect the worker from injury and health hazards. Regular checks and monitoring of compliance ensure that people working or being operated near the plant and the machinery are adequately protected.

### 7.2.8. Exercise

1. What is the primary responsibility when monitoring the safe handling and operation of plant, machinery, and vehicles at work sites?

- a) To ensure that the equipment is clean and operational
- b) To ensure operators follow safety guidelines and use appropriate PPE
- c) To schedule regular maintenance of equipment
- d) To ensure machines are only operated during specific hours

2. Which of the following is essential for ensuring safe operations of plant, machinery, and vehicles at a work site?

- a) Only ensure the machinery is regularly serviced
- b) Verify that operators are properly trained and follow manufacturer's instructions
- c) Ignore the use of personal protective equipment (PPE)
- d) Ensure the worksite is only safe during working hours

3. True or False: It is only necessary to monitor the safe operation of plant, machinery, and vehicles at work sites when there is a scheduled inspection.

4. True or False: All operators must be trained to follow the manufacturer's instructions and safety guidelines to prevent accidents and injuries.

5. To ensure the safe operation of plant, machinery, and vehicles at a work site, operators must always follow \_\_\_\_\_ instructions and safety guidelines.

6. Before allowing personnel to operate machinery or vehicles, it is important to verify that they are wearing the appropriate \_\_\_\_\_ (PPE).

### **7.3. Unit 7.2. Conduct Inspections and Fault Detection**

#### **7.3.1. Unit Objectives**

At the end of this unit, students will be able to:

- Carry out pre-operational checks on machinery, plant, and road vehicles to discover possible faults before equipment is used.
- Identify signs of wear, damage, or malfunctions during inspections and effectively report them to the maintenance team for corrective action.
- Accurately record the findings from inspections and any faults reported to have the worksite fully operational while ensuring safety.

#### **7.3.2. Resources**

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

#### **7.3.3. Ask**

- Describe about pre-operational checks on machinery, plant, and road vehicles.
- Describe about process how to identify signs of wear, damage, or malfunctions during inspections
- Describe about recording process of findings

#### **7.3.4. Explain**

- Describe about pre-operational checks on machinery, plant, and road vehicles.
- Describe about process how to identify signs of wear, damage, or malfunctions during inspections
- Describe about recording process of findings

### 7.3.5. Activity

Divide the class into small groups (3-4 students per group).

Inspect a crane

Each group will:

Use the inspection checklist to go through the required inspection steps.

Identify faults, wear, or malfunctions on crane. They may find problems such as low fuel, worn-out tires, or malfunctioning lights.

Report any faults to the “maintenance team” (the instructor or designated students). Discuss what actions should be taken to resolve these issues.

Document the inspection results on a pre-designed inspection form, noting any identified issues and the proposed solutions.

### 7.3.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 7.3.7. Summary

#### **Conduct pre-operation checks of machinery, plant, and vehicles to establish faults**

The most significant task involves carrying out pre-operation inspections so that machinery, plant, and vehicles are safe and working correctly. Such pre-operation inspections are carried out before any operation; this allows possible faults, hazards, or requirements for maintenance to be identified, which helps to prevent accidents, equipment failure, and costly downtime. Some of the common systems that may be inspected during an inspection include engines, tires, brakes, lights, safety features, and fluid levels.

#### **Identify any wear, damage, or malfunctions and report these to the maintenance team.**

During the inspection process, any sign of wear, damage, or malfunction that might affect the safe operation of equipment should be identified. This includes checking for physical wear (such as worn-out tires), leaks, malfunctioning components, or other issues that may compromise the functionality of the equipment. Once identified, these issues must be promptly reported to the maintenance team for further inspection, repair, or replacement, ensuring that equipment is safe and reliable before use.

#### **Document Inspection Results and Ensure That Any Faults Are Addressed Promptly**

Proper documentation of findings from the pre-operation check-up is important to keep proper records and for early detection and rectification of faults. Results of inspection should be kept on a standard form or checklist noting the nature of any problems identified and the respective corrective action required. Proper documentation helps scheduling of maintenance requirements, schedules repairs, and provides ready reference for follow-up inspections. Prompt action should be taken to avoid delays in operations and overall safety if any fault comes in.

### 7.3.8. Exercise

#### **1. What is the primary goal of performing a pre-operation inspection on machinery, plant, and vehicles?**

- To ensure the equipment is running at maximum efficiency
- To identify faults, wear, or damage before operation
- To clean the equipment
- To measure the operator's performance

#### **2. What should be done if damage or a malfunction is identified during the inspection?**

- Continue operating the equipment as usual

- b) Report the issue to the maintenance team for immediate attention
- c) Ignore it until the next inspection
- d) Use the equipment for non-critical tasks

3. A pre-operation inspection helps to identify \_\_\_\_\_ before machinery, plant, or vehicles are used in the work environment.

4. When faults or malfunctions are detected during an inspection, they should be \_\_\_\_\_ to the maintenance team immediately for repairs.

5. True or False: Pre-operation inspections should only focus on the exterior appearance of machinery and vehicles.

6. True or False: Documenting the inspection results is not necessary if the faults are reported to the maintenance team verbally.

## **7.4. Unit 7.3. Implement Safety Protocols to Prevent Accidents**

### **7.4.1. Unit Objectives**

At the end of this unit, students will be able to:

- To ensure that equipment and machinery operate safely during servicing by following safety requirements, including lockout/tagout procedures
- To monitor the vehicle and human interactions on work sites to prevent accidents and identify and mitigate environmental risks
- To maintain a safe and efficient working environment, reduced risks, and well-being for all personnel.

### **7.4.2. Resources**

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### **7.4.3. Ask**

- Describe about equipment and machinery safety
- Describe about process of monitor the vehicle and human interactions on work sites to prevent accidents
- Describe about process to maintain a safe and efficient working environment

### **7.4.4. Explain**

- Describe about equipment and machinery safety
- Describe about process of monitor the vehicle and human interactions on work sites to prevent accidents
- Describe about process to maintain a safe and efficient working environment

### 7.4.5. Activity

Divide students into small groups and assign each group a piece of machinery or equipment (use photos or simple models if actual machinery isn't available).

Provide the groups with a step-by-step lockout/tagout checklist and ask them to perform the procedure on their assigned machinery or equipment.

After completing the lockout/tagout procedure, ask each group to explain their steps, highlighting safety precautions taken and any potential risks if procedures are not followed.

The instructor can simulate errors in the procedure to test the group's awareness and understanding.

### 7.4.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 7.4.7. Summary

#### **Maintain all safety procedures such as Lockout/Tagout Procedures during servicing.**

Lockout/tagout procedures are basic safety procedures designed to ensure there is no inadvertently energized machinery when under any form of maintenance. These comprise the disconnection of energy sources coupled with locking and tagging them for the purpose that they cannot once again be operated without someone reenergizing them. People performing maintenance cannot be injured nor killed by surprising movements of the equipment or from electrical shock from lockout/tagout. This is one of the most fundamental processes in any work environment that regularly maintains or services machinery.

#### **Monitor Vehicle to Human Interaction to Prevent Accidents**

Interaction between the vehicle and personnel is a significant safety issue at a work site. Proper monitoring and control of such interactions should be maintained in order to avoid possible accidents such as collision or injury through others. Also, safety measures such as a walkway, warning signs, and communication systems keep vehicles and personnel separated in high-traffic areas. This also encompasses training the operators and workers to be alert of each other's movements, use personal protective equipment, and maintain clear visibility and communication at the site.

#### **Identify and Mitigate Environmental Risks, such as Uneven Surfaces or Weather Conditions**

This might include uneven surfaces, weather, or any environmental risk that would make the place hazardous. Knowing and mitigating these risks ensures safety at work. Uneven surfaces may lead to trips and slips or make equipment unstable. Adverse weather conditions such as rain, fog, or snow may reduce visibility and traction. To minimize the risk, site assessments must be done by the employers and the installation of safety measures, such as proper signage and appropriate training in the identification and response to environmental hazards, to workers. Proactive measures to address environmental risks are taken so that workplaces are protected from accidents and a safe working environment is guaranteed.

### 7.4.8. Exercise

1. Which of the following is the primary purpose of lockout/tagout procedures?

- a) To ensure machinery operates at its maximum efficiency
- b) To prevent unauthorized access to equipment
- c) To ensure that equipment is properly shut off and cannot be accidentally started during maintenance
- d) To monitor the performance of machinery during use

2. What should be done before beginning maintenance on machinery or equipment?

- a) Review the operator's performance
- b) Ensure lockout/tagout procedures are followed
- c) Increase the operational speed of the equipment
- d) Notify clients about maintenance schedules

3. Lockout/tagout procedures are essential to ensure that machinery or equipment is properly \_\_\_\_\_ and cannot be inadvertently started during maintenance.

4. To prevent accidents on work sites, it is important to create designated \_\_\_\_\_ for vehicles and personnel to safely interact and avoid collisions.

5. True or False: Monitoring the interaction between vehicles and personnel is not important as long as there are no reported accidents.

6. True or False: Ensuring that safety protocols are followed during maintenance, such as lockout/tagout procedures, is crucial to prevent accidental equipment start-up during repairs.

## **7.5. Unit 7.4. Coordinate with Teams and Ensure Compliance**

### **7.5.1. Unit Objectives**

At the end of this unit, students will be able to:

- **To ensure the implementation of all safety protocols and regulations.**
- **To understand safety briefings and will contribute invaluable input for continuous improvement in safety practices and procedures**
- **To foster a safety-conscious culture, promote collaboration across teams, and ensure ongoing improvements in workplace safety.**

### **7.5.2. Resources**

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### **7.5.3. Ask**

- Describe about safety protocols and regulation
- Describe about safety briefings
- Describe about safety culture

#### 7.5.4. Explain

- Describe about safety protocols and regulation
- Describe about safety briefings
- Describe about safety culture

#### 7.5.5. Activity

Divide the class into small groups (3-4 people per group) and assign roles within each group (machine operator, supervisor, safety officer).

Provide each group with a scenario card that describes a safety issue or compliance challenge in a work environment (e.g., a machine malfunction, improper PPE usage, an unreported hazard, or a new safety regulation to implement).

Groups must discuss the scenario and collaborate on how they will ensure compliance with safety standards. They should use:

A compliance checklist to identify which safety standards apply.

Discuss how to communicate effectively to solve the issue, considering each role's responsibility.

Each group will present their solution to the class, explaining how they ensured compliance with both statutory and organizational safety standards.

#### 7.5.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

#### 7.5.7. Summary

Cooperation with machine operating personnel, foremen, and safety officers in achieving the needs.

Collaboration among the operators, supervisors, and safety officers is crucial to ensure safety procedures are uniformly implemented at every level of operation. The frontline workers, or the machine operators, provide day-to-day information about safety concerns, while supervisors oversee the entire safety process. Safety officers are responsible for implementing safety standards and inspecting machinery. Through collaboration, these roles can identify potential hazards, address non-compliance issues, and ensure that the workplace adheres to safety regulations, thus creating a culture of safety and compliance.

Compliance with statutory and organizational standards on safety.

Workplace practices should be compatible with both legal or statutory and organizational safety policies. Statutory safety standards encompass mandatory standards permitted by the concerned authorities, while organizational safety standards are company or industry-specific and often include higher levels of practices than statutory levels. Complying with both standards decreases risks and prevents accidents in the workplace. It demands constant observation, proper training, and ongoing appraisal to match the consistency of safety protocols implementation.

Attend briefing on safety Provide feed-forward to enhance

Briefings regarding safety include in dealing with safety at the workplace. Being included in such briefings means that all team members stay informed about their safety concerns, upcoming risks, and changes to the safety procedures. Further, input during these sessions fosters a culture of continuous improvement. Employees can voice suggestions, deliberate on potential issues, and engage in strategies aimed at further elevating safety standards. This collaborative approach to safety ensures that improvements are made, lessons are learned, and everyone on the team is empowered to actively contribute to maintaining a safe working environment.

### 7.5.8. Exercise

1. Which of the following best describes the role of safety officers in ensuring compliance?
  - a) They only monitor the performance of machines and equipment.
  - b) They are responsible for enforcing safety standards and conducting inspections.
  - c) They are responsible for handling administrative tasks only.
  - d) They focus on improving the quality of products manufactured.
2. What is the primary benefit of collaboration between machine operators, supervisors, and safety officers?
  - a) To share personal work experiences.
  - b) To ensure safety protocols are consistently followed and address any compliance issues.
  - c) To increase production speed.
  - d) To minimize downtime in equipment.
3. To ensure compliance with safety standards, collaboration between machine operators, supervisors, and safety officers is \_\_\_\_\_.
4. Safety officers are responsible for \_\_\_\_\_ safety standards and conducting regular safety inspections to ensure compliance.
5. True or False: Collaboration between machine operators, supervisors, and safety officers is important only for meeting legal safety requirements, not for improving workplace safety
6. True or False: Statutory safety standards are mandated by local authorities, while organizational safety standards are voluntary guidelines created by the company.

## 8. Unit 8 NOS 7: SSD/N0333 v1.0 : Planning and Organizing Lifting and Rigging Emergency Protocols

### 8.1. Key Learning Outcomes

- Identify potential emergencies and risks during lifting and rigging operations.
- Develop and implement emergency response plans.
- Coordinate with operators, riggers, supervisors, and safety personnel.
- Conduct emergency drills and simulations to improve preparedness.
- Ensure compliance with emergency management policies and regulations.

### 8.2. Unit 8.1: Identify Potential Emergencies and Risks

#### 8.2.1. Unit Objectives

At the end of this unit, students will be able to:

- To identify common emergencies, such as equipment failures, load slippage, or environmental hazards, and assess site conditions and risks that could lead to emergencies.
- To understand how to effectively monitor equipment and team activities
- To observe early signs of potential emergencies for a proactive approach to safety and risk management at the workplace.

### 8.2.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 8.2.3. Ask

- Describe about how to identify common emergencies
- Describe about how to effectively monitor equipment and team activities
- Describe about proactive approach to safety and risk management at the workplace.

### 8.2.4. Explain

- Describe about how to identify common emergencies
- Describe about how to effectively monitor equipment and team activities
- Describe about proactive approach to safety and risk management at the workplace.

### 8.2.5. Activity

Divide the class into small groups (3-4 participants). Give each group a set of scenario cards that describe common worksite conditions (e.g., faulty crane, icy weather, unbalanced load, etc.).

Each group will:

Identify which emergency each scenario represents.

List potential outcomes or dangers associated with each situation.

Present their findings to the class.

### 8.2.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 8.2.7. Summary

**Identify Common Emergencies**

It focuses on the ability to recognize typical emergencies that can occur in a work environment, such as equipment failures (e.g., machinery breakdown), load slippage (e.g., an unbalanced or shifting load), and environmental hazards (e.g., extreme weather, hazardous materials). Being able to identify these emergencies early is crucial for preventing accidents and ensuring the safety of both personnel and equipment.

**Assess Site Conditions and Risks**

It highlights the evaluation of the conditions at a worksite to find out any risk factors that may eventually lead to emergencies. This is done by looking into site layout, weather, equipment status, and human factors that may grow into dangerous events. A thorough risk assessment will prevent incidents as hazards are controlled before they grow into emergencies.

**Monitor Equipment and Team Activities**

This involves the continuous monitoring of equipment and team activities to find early signs of potential emergencies. This includes monitoring machinery for possible malfunction, keeping track of load conditions, and ensuring that the team is practicing safety protocols. Vigilance and proactivity can lead to early intervention and prevent a situation from becoming an actual emergency. This reduces risk and promotes safety in the working environment.

### 8.2.8. Exercise

1. Which of the following is an example of an environmental hazard?
  - a) Equipment failure
  - b) Load slippage
  - c) Extreme weather conditions
  - d) Human error
2. What is the best way to detect early signs of an emergency?
  - a) Monitoring equipment and team activities regularly
  - b) Waiting for the emergency to escalate
  - c) Only conducting checks once a day
  - d) Ignoring minor issues and focusing only on major problems
3. Environmental hazards, such as extreme weather, do not affect worksite safety. (T/F)
4. Assessing site conditions regularly is not necessary for preventing potential emergencies. (T/F)
5. When assessing site conditions, it is important to consider \_\_\_\_\_, weather, and equipment status.
6. Early detection of potential emergencies can be achieved by \_\_\_\_\_ equipment and observing team activities.

## 8.3. Unit 8.2: Develop and Implement Emergency Response Plans

### 8.3.1. Unit Objectives

At the end of this unit, students will be able to:

- To prepare an all-inclusive emergency response plan in conformity with organizational policies
- To explain the roles and responsibilities of those involved in emergencies
- To ensure that critical emergency equipment such as alarms, fire extinguishers, and rescue kits are available and in good working order.
- To establish adequate measures for emergency preparedness, improve teamwork during emergencies, and ensure equipment is prepared and ready to respond efficiently in case of an emergency.

### 8.3.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 8.3.3. Ask

- Describe about emergency response plan
- Describe about roles and responsibilities of those involved in emergencies
- Describe about critical emergency equipment such as alarms, fire extinguishers, and rescue kits

### 8.3.4. Explain

- Describe about emergency response plan
- Describe about roles and responsibilities of those involved in emergencies
- Describe about critical emergency equipment such as alarms, fire extinguishers, and rescue kits

### 8.3.5. Activity

Divide the class into small groups (4-5 participants per group). Assign each group a specific emergency scenario (e.g., fire, hazardous chemical spill, medical emergency). Each group will:

Develop a detailed emergency response plan for their assigned scenario. The plan should align with organizational policies and include key components such as:

Procedures for alerting and evacuating personnel

Communication strategies

Specific actions to be taken

Identification of key emergency contacts

Present their plan to the class, explaining how it aligns with organizational policies and why it is effective for the scenario.

### 8.3.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 8.3.7. Summary

#### **Prepare Detailed Emergency Response Plans Aligned with Organizational Policies**

The importance is given to establishing all-around comprehensive emergency response plans, keeping within the policy and procedures already determined for the organization. Learners will learn to establish clear and effective, step-by-step responses for all possible kinds of emergencies-emergency responses on fire, medical, and disaster scenarios-including communication lines and evacuation schemes along with the contact for outside help, all put in a system to enable speed and effectiveness at every level during any event of this kind.

#### **Define Team Member Roles and Responsibilities During Emergency Situations**

This requirement shows the necessity of role definition and responsibilities during an emergency. Who does what—coordinating evacuation, first aid, or emergency service call—is clarified to avoid confusion and delay when responding to emergencies. This activity involves the designation of specific roles, establishment of a chain of command, and ensuring everyone is trained and ready for their task, thereby strengthening teamwork and effectiveness in crisis response.

#### **Provide Access to Available and Functional Emergency Equipment**

This criterion emphasizes the need to ensure that all emergency equipment, including alarms, fire extinguishers, rescue kits, and first aid supplies, are available and in good working condition. Checks, maintenance, and replacement of equipment are necessary to ensure that they work effectively when needed. This also involves ensuring that all team members know the location and proper use of emergency equipment, making sure that it is accessible and fully functional in an emergency.

### 8.3.8. Exercise

1. What is the primary purpose of preparing a detailed emergency response plan?
  - a) To comply with legal requirements
  - b) To ensure everyone knows how to react during an emergency
  - c) To reduce costs associated with emergencies
  - d) To create paperwork for insurance purposes
2. Which of the following should be included in an emergency response plan?
  - a) Procedures for employee evaluations
  - b) Communication protocols during an emergency
  - c) Financial records
  - d) Employee performance reviews
3. Emergency response plans should be regularly reviewed and updated to align with organizational policies and changes. (T/F)
4. The roles and responsibilities of team members during an emergency should be flexible and undefined to allow for improvisation. (T/F)

5. An emergency response plan should be aligned with \_\_\_\_\_ policies to ensure that the organization's procedures and protocols are followed.

6. During an emergency, it is crucial that every team member knows their specific \_\_\_\_\_ and tasks to ensure an organized response.

## **8.4. Unit 8.3: Coordinate Emergency Protocols and Team Actions**

### **8.4.1. Unit Objectives**

At the end of this unit, students will be able to:

- To coordinate emergency protocols and team actions effectively by working along with the crane operators, riggers, and supervisors
- To ensure that the emergency procedures are executed without a hitch.
- To understand clear lines of communication and designated emergency leaders will enhance coordination during crises.
- To understand how to monitor and check compliance with emergency procedures, particularly during lifting operations

### **8.4.2. Resources**

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### **8.4.3. Ask**

- Describe about emergency protocols
- Describe about process of clear lines of communication of emergency
- Describe how to monitor and check compliance with emergency procedures

### **8.4.4. Explain**

- Describe about emergency protocols
- Describe about process of clear lines of communication of emergency
- Describe how to monitor and check compliance with emergency procedures

### **8.4.5. Activity**

Divide the class into small groups (4-5 participants per group). Assign each group a different emergency scenario related to lifting operations (e.g., crane malfunction, load slippage, worker injury during a lift).

Each group will:

Designate roles: crane operator, rigger, supervisor, and emergency leader.

Develop an action plan to respond to the emergency, including the coordination of all roles.

Execute the scenario through role play, ensuring that communication flows smoothly and each role is clearly defined. The supervisor should provide instructions, the crane operator should adjust operations, and the rigger should manage the load while the emergency leader oversees the protocol execution.

After completing the role play, each group will present their actions and explain how they coordinated the emergency protocol with the team.

### **8.4.6. Notes for Facilitation**

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.

- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

#### 8.4.7. Summary

##### **Liaise with crane operators, riggers, and supervisors to execute the emergency protocol.**

This criterion focuses on the ability to work in collaboration with crane operators, riggers, and supervisors during emergencies to ensure that emergency protocols are executed smoothly. It emphasizes coordination among key personnel to effectively manage the situation, maintain safety, and prevent further complications. The objective is to ensure that each team member knows his role in the emergency response and works together to carry out necessary actions swiftly and efficiently.

##### **Clear lines of communication, identify emergency leaders**

Effective communication would be very essential at the time of an emergency. This would essentially mean that open and straightforward lines of communication exist among all the persons involved, especially between the crane operators, riggers, and supervisors. Another issue is designating emergency leaders to take charge of the response: taking charge of the action, giving clear instructions, coordinating the actions, and making quick decisions in situations. Through opening avenues of clear communication, the team will ensure that every member is well-informed and better responds.

##### **Monitor Adherence to Emergency Procedures During Hoisting Operations**

It indicates the need to actively monitor compliance with emergency procedures established upon formation, particularly for lifting operations. Generally, it seeks to ensure that all members of the team adhere to the safety rules and emergency response procedures in the process. This ensures that the accident never happens, that the lifting procedures are followed, all the safety checks are completed, and anything that happens in the deviation or potential hazard is addressed right away. Monitoring compliance can ensure a safe environment and prevent emergencies from escalating.

#### 8.4.8. Exercise

1. What is the primary goal when coordinating with crane operators, riggers, and supervisors during an emergency?
  - a) To increase the speed of the lifting operation
  - b) To ensure the smooth execution of emergency protocols
  - c) To identify the cause of the emergency
  - d) To document the emergency for reporting purposes
2. Why is it important to establish clear lines of communication during an emergency?
  - a) To reduce the number of team members involved
  - b) To ensure that all team members are informed and can act quickly
  - c) To avoid paperwork during the emergency
  - d) To prevent misunderstandings about the tasks
3. Clear communication channels are not necessary during an emergency response as long as each team member understands their role.
4. The crane operator and rigger are the primary individuals responsible for monitoring compliance with emergency procedures during a lifting operation.
5. During an emergency, it is essential to \_\_\_\_\_ with crane operators, riggers, and supervisors to ensure smooth execution of the response plan.
6. Clear lines of \_\_\_\_\_ are crucial to ensure all team members are informed and can respond appropriately during an emergency.

### 8.5. Unit 8.4: Conduct Drills, Simulations, and Post-Incident Reviews

#### 8.5.1. Unit Objectives

At the end of this unit, students will be able to:

- To schedule and implement routine emergency exercises and drills.
- To record and monitor the results of emergency exercise drills.
- To identify areas for improvement and refine procedures to address potential crises.
- To conduct reviews after incidents to identify gaps in emergency response.

- To make recommendations for improvements to enhance future responses and team performance.

### 8.5.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 8.5.3. Ask

- Describe about process of schedule and implement routine emergency exercises and drills
- Describe about process of record and monitor the results of emergency exercise drills
- Describe how to conduct reviews after incidents to identify gaps in emergency response.

### 8.5.4. Explain

- Describe about process of schedule and implement routine emergency exercises and drills
- Describe about process of record and monitor the results of emergency exercise drills
- Describe how to conduct reviews after incidents to identify gaps in emergency response.

### 8.5.5. Role play

Divide the class into small groups (4-5 participants per group).

Assign each group a different emergency scenario (e.g., fire evacuation, crane malfunction, medical emergency during a lifting operation).

Role-play the scenario: Each group will organize and simulate their assigned emergency drill. The group must assign roles (e.g., emergency leader, crane operator, rigger, supervisor, first aid responder) and simulate the emergency response steps according to a pre-prepared emergency protocol.

Execute the drill: The group will act out the emergency scenario while ensuring smooth coordination and communication between team members.

Evaluate during the drill: Each group should take note of any challenges or areas that can be improved during the drill execution. Afterward, they will prepare to evaluate the drill's effectiveness.

### 8.5.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 8.5.7. Summary

#### **Regularly conduct emergency drills and simulations to enhance team preparedness**

This performance criterion shows that there is a need for emergency drills and simulations to be carried out regularly. It helps members of the team respond to emergencies through drills and simulations that are carried out to prepare teams in a controlled environment. Preparing these drills increases the prompt and effective response during a real incident. During the exercise, the teams will be able to develop muscle memory, coordination, and communication skills, hence, being prepared enough for emergencies.

#### **Document and Evaluate the Effectiveness of Drills and Procedures**

After the emergency drills and simulations, it is always very important to document the outcomes of the drills and make an evaluation of the effectiveness of the drills and procedures. This will include finding out how well the team followed emergency response procedures, the time taken by them, and if

problems or gaps occurred at any point during the drill. Teams can determine areas that need improvement and fine-tune their procedures to perform better in future emergencies through documentation and evaluation of the drills. Continuous evaluation is necessary to keep emergency protocols relevant and effective.

### **Conduct Post-Incident Reviews to Identify Gaps and Improve Future Responses**

Post-incident reviews are an integral part of the emergency response process. As a follow-up action to the emergency or even a drill, it is important to review comprehensively what happened and determine what steps or measures might have failed in the response. Reviews focus on analysing the responses given, recognizing areas of weaknesses or inefficiencies, and ascertaining what went right and what did not. Findings from these reviews are used to work on refinement of emergency protocols, upgrading training, and recommending change in equipment, roles, or communication strategies. Continuous conduct of post-incident review ensures that the team constantly improves its capability for emergency response.

#### **8.5.8. Exercise**

1. Why are regular emergency drills and simulations important for team preparedness?
  - a) To ensure compliance with legal regulations
  - b) To familiarize team members with emergency procedures
  - c) To reduce the time spent on training
  - d) To test the financial cost of emergencies
2. What is the primary purpose of documenting and evaluating emergency drills?
  - a) To keep a record for insurance purposes
  - b) To identify areas for improvement in emergency response
  - c) To provide evidence for audits
  - d) To compare performance against other teams
3. Emergency drills are only necessary once a year to ensure team preparedness. (T/F)
4. Evaluating the effectiveness of emergency drills helps improve response times and adherence to procedures. (T/F)
5. Regular emergency drills and simulations are important for \_\_\_\_\_ team preparedness and ensuring effective response during actual emergencies.
6. After conducting a drill, it is crucial to \_\_\_\_\_ the effectiveness of the drill and identify any gaps in emergency response protocols.

## **9. Unit 9 NOS 8: SSD/N0334 v1.0 : Load Planning and Stability**

### **Control in Lifting Operation**

#### **9.1. Key Learning Outcomes**

- Plan and prepare for load-lifting operations.
- Conduct accurate weight and load distribution calculations.
- Implement stability control measures to prevent equipment tipping.
- Verify that equipment capacity and load limits are not exceeded.
- Collaborate with crane operators, rigging supervisors, and safety personnel to ensure safe operations.

#### **9.2. Unit 9.1. Plan and Prepare for Load Lifting Operations**

##### **9.2.1. Unit Objectives**

**At the end of this unit, students will be able to:**

- To understand environmental conditions and the site condition for lifting operations
- To identify the kind of loads to be lifted, the weight involved.

- To understand nature of the load
- To ensure that the lifting equipment and accessories are suitable for the operation.

### 9.2.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 9.2.3. Say

- Describe about environmental conditions and the site condition suitable for lifting operations
- Describe about load and its characteristics
- Describe about lifting equipment and accessories

### 9.2.4. Explain

- Describe about environmental conditions and the site condition suitable for lifting operations
- Describe about load and its characteristics
- Describe about lifting equipment and accessories

### 9.2.5. Activity

Give each group a load scenario card with a detailed description of the load to be lifted (e.g., dimensions, material type, intended destination).

The group will:

Identify the type of load (e.g., static, dynamic, heavy, bulky).

Calculate or estimate the weight of the load using available information (or provide approximations based on the scenario).

Discuss how the load type and weight affect the lifting operation, including the required equipment and lifting methods.

After discussing the load characteristics, each group will present:

The type of load.

The estimated weight and its impact on the lifting operation (e.g., required crane capacity).

### 9.2.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 9.2.7. Summary

#### Evaluate the site conditions and determine the feasibility of lifting operations .

It is important to assess the site conditions diligently before carrying out any lifting operation, not just to ensure safety and feasibility, but to evaluate conditions such as terrain, weather, access, and also any other related hazards. This will tell if a lifting operation can be safely performed or if it will require modifications, such as improving site access or creating a stable equipment platform for its setup.

#### Identification of Type and Weight of Loads to be Moved

Proper identification of the type and weight of loads will ensure that the right lifting equipment and methods are used. The load must be accurately classified as either static or dynamic, and the weight must be determined precisely. Knowing the characteristics of the load helps in proper planning of the lift and ensures that the equipment has the capacity to handle the load safely, avoiding accidents or equipment failure.

#### Confirm that the Lifting Equipment and Accessories are capable of performing the operation

The lifting equipment and accessories, including cranes, hoists, slings, shackles, and hooks, must be appropriate for the given operations to avoid accidents and ensure a successful operation. The equipment used must be checked according to its weight capacity, its condition, and whether it is suitable for the type of load being carried. Proper verification will ensure that all the hoisting tools are safe to use, minimizing failure, ensuring that a lift could be achieved effectively and safely.

### 9.2.8. Exercise

1. Why is it important to assess site conditions before performing lifting operations?
  - a) To estimate the cost of the operation
  - b) To ensure there are no regulatory violations
  - c) To determine if the environment is safe for the operation
  - d) To assess the experience of the operators
2. What is the importance of identifying the weight of a load before a lift?
  - a) It determines the size of the crane needed
  - b) It helps calculate the lifting cost
  - c) It ensures the load does not exceed the lifting equipment's capacity
  - d) It helps select the workers to carry the load
3. The type of load and its weight are irrelevant when determining the feasibility of a lifting operation. (T/F)
4. Assessing the site conditions is important to ensure the area is free of hazards that could affect the lifting operation. (T/F)
5. Before starting a lifting operation, it is essential to assess the \_\_\_\_\_ to ensure it is safe and suitable for the task.
6. The weight and type of the load must be accurately identified to select the appropriate \_\_\_\_\_ for the operation.

## 9.3. Unit 9.2. Calculate Weight, Load Distribution, and Sling Angles

### 9.3.1. Unit Objectives

At the end of this unit, students will be able to:

- To understand why all components of the load must be included in weight calculations to avoid overloading lifting equipment.
- To understand the concept of the centre of gravity (CG) and how it affects load stability during lifting operations.
- To calculate and locate the CG for various types of loads.
- To acquaint oneself with sling angles and how it would affect the stability of the load along with its effects on equipment used for lifting.

- To ensure the right calculation of sling angles to distribute weight evenly and keep the lifting appliances from damage due to uneven support.
- To identify critical pressure areas on the lifted load and place them in full support to offer stability during handling.

### 9.3.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 9.3.3. Ask

- Describe about load calculation and its component
- Describe about load and its characteristics
- Describe about lifting equipment and accessories
- Describe about calculation of sling angles and type of sling

### 9.3.4. Explain

- Describe about load calculation and its component
- Describe about load and its characteristics
- Describe about lifting equipment and accessories
- Describe about calculation of sling angles and type of sling

### 9.3.5. Activity

Divide participants into small groups (3-4 people per group).

Provide each group with a load scenario sheet that describes a load, including its main item, attachments (e.g., hooks, shackles), and accessories (e.g., lifting slings, spreaders).

Task:

Each group will calculate the total weight of the load by adding the weights of the main load, attachments, and accessories (if provided) based on the given data.

Groups will ensure that all components are considered to avoid underestimating the weight, which could lead to overloading the equipment.

After calculating, groups will share their results with the class and discuss the importance of accounting for every part of the load.

### 9.3.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 9.3.7. Summary

**Calculate the Total Weight of Loads, Including Attachments and Accessories**

Calculating the total weight of a load is a critical step in ensuring that lifting equipment is not overloaded. This includes considering not only the main load but also any attachments (e.g., hooks, spreaders) and accessories (e.g., slings, shackles) that will be part of the lifting operation. Accurate weight calculation ensures that the lifting equipment is used within its rated capacity, which helps prevent accidents and ensures a safe lift.

### **Determine Centre of Gravity and Load Distribution for Safe Lifting**

The centre of gravity (CG) refers to the point where the load's mass is concentrated and affects its balance during lifting. Determining the CG is essential for ensuring safe lifting operations, as a load with an uneven CG can tip or cause instability. Proper load distribution, considering the CG, ensures that the load is evenly balanced and reduces the risk of swinging, tipping, or damaging the lifting equipment.

### **Calculate Sling Angles and Pressure Points to Ensure Load Stability**

Sling angles are a key factor in determining how forces are distributed during a lift. Correctly calculating the sling angles ensures that the load is stable, and that forces are evenly distributed across the lifting accessories, preventing excessive stress or damage. Additionally, identifying pressure points on the load and ensuring they are properly supported helps maintain stability throughout the lift, reducing the risk of accidents or failure during lifting operations.

#### **9.3.8. Exercise**

1. Why is it important to calculate the total weight of a load, including attachments and accessories?
  - a) To ensure the lifting equipment is not overloaded.
  - b) To estimate the time required for the lift.
  - c) To determine the cost of the operation.
  - d) To ensure the load is correctly balanced..
2. What does the centre of gravity (CG) of a load affect during lifting operations?
  - a) The colour of the load.
  - b) The stability and balance of the load.
  - c) The speed of the lift.
  - d) The number of workers required for the lift.
3. The centre of gravity is the point where the total weight of the load is concentrated. (T/F)
4. Only the main load needs to be considered when calculating the total weight of the load. (T/F)
5. The total weight of a load should include the weight of the main load, \_\_\_\_\_, and accessories.
6. The \_\_\_\_\_ of a load determines its balance during the lift and is critical for load stability.

## **9.4. Unit 9.3. Implement Stability Control Measures**

### **9.4.1. Unit Objectives**

**At the end of this unit, students will be able to**

- **To correctly place counterweights on cranes or lifting equipment to maintain proper balance during lifting operations.**
- **To understand how to determine the required counterweights based on the load being lifted and ensure the correct placement to prevent tipping or instability.**
- **To understand crane stability indicators and load charts during lifting operations.**

- **To understand boom angle, sling length, and load position during lifting operations to maintain crane stability.**

#### 9.4.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

#### 9.4.3. Ask

- Describe about counterweights on cranes
- Describe about crane stability indicators and load charts
- Describe about boom angle, sling length, and load position

#### 9.4.4. Explain

- Describe about counterweights on cranes
- Describe about crane stability indicators and load charts
- Describe about boom angle, sling length, and load position

#### 9.4.5. Activity

Divide participants into small groups (3-4 members per group).

Scenario: Provide each group with a crane simulation setup or a physical model with adjustable counterweights. Each group will be given a load scenario (e.g., lifting a heavy load with varying distances from the crane).

Task:

Groups will determine how much counterweight is needed for the crane to maintain balance with the given load.

They will adjust the counterweights and observe how the crane's stability is affected.

Discussion: After each group completes the task, have them explain their counterweight calculation process and how they ensured the crane remains balanced.

#### 9.4.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

#### 9.4.7. Summary

##### **Confirm Counterweights Are Properly Positioned to Obtain Counterbalance**

Proper positioning of counterweights achieves the crux of crane stability in operation, especially when lifting. Counterweights ensure that the centre of gravity is kept within limits as stipulated. When properly applied, they achieve adequate counterbalance, preventing crane tipping or loss of balance. Correct positioning of counterweights helps in balancing loads and thus reduces the chances of accidents caused by crane overload.

### **Monitor crane stability indicators and load charts during lifting operations.**

Monitoring crane stability indicators and load charts is significant to ensure a safe lifting operation. Stability indicators, such as tilt sensors, and load charts provide real-time data on the crane's operational limits, ensuring that the crane is not overloaded. Checking these indicators frequently will enable the operator to make decisions to adjust the lift so that the crane does not exceed its safe working capacity.

### **Boom angle, sling length, and load position will be adjusted as necessary to maintain stability.**

The boom angle, sling length, and load position are all good ways to stabilize the crane during lifting operations. The boom angle will significantly affect the crane's lifting capacity. Meanwhile, sling length and load position determine how the weight would be distributed. Proper adjustment will minimize the likelihood of instability or crane failure. Thus, it is highly essential to execute adjustments for safe, efficient, and successful lifting operations.

#### **9.4.8. Exercise**

1. Why is it important to correctly place counterweights on a crane during lifting operations?
  - a) To make the crane lighter
  - b) To ensure proper balance and prevent tipping
  - c) To reduce the crane's lifting capacity
  - d) To make the crane more efficient in fuel usage
2. What role do stability indicators play in crane lifting operations?
  - a) They measure the weight of the load.
  - b) They help determine the load's centre of gravity.
  - c) They help monitor the crane's operational limits and stability.
  - d) They control the boom angle during the lift.
3. Adjusting the boom angle, sling length, and load position is necessary to maintain stability and prevent accidents.
4. A crane's stability indicators should be checked before, but not during, lifting operations.
5. Counterweights must be correctly placed to ensure the crane's \_\_\_\_\_ and prevent tipping during lifting operations.
6. Crane \_\_\_\_\_ indicators provide real-time data on the crane's stability and help prevent overloads.

## **9.5. Unit 9.4. Verify Equipment Capacity and Load Limits**

### **9.5.1. Unit Objectives**

**At the end of this unit, students will be able to:**

- To assess the load weight to ensure it is within the lifting equipment's specified capacity.
- To learn how to cross-check the weight of the load with the equipment's rated capacity to prevent overloading and ensure safe lifting operations.
- To understand the importance of having load charts and equipment manuals readily available during lifting operations.
- To verify that lifting operations follow relevant regulatory standards and safety protocols.

### **9.5.2. Resources**

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.

- Activities (role plays)

### 9.5.3. Ask

- Describe about assess the load weight and how to cross-check the weight of the load
- Describe about load charts and equipment manuals
- Describe about lifting operations follow relevant regulatory standards and safety protocols

### 9.5.4. Explain

- Describe about assess the load weight and how to cross-check the weight of the load
- Describe about load charts and equipment manuals
- Describe about lifting operations follow relevant regulatory standards and safety protocols

### 9.5.5. Activity

Each group will receive a lifting scenario that includes a load weight, equipment capacity, and other relevant data (e.g., crane type, lifting height, load dimensions).

Groups will calculate whether the load weight exceeds the equipment's capacity.

Participants will check the weight of the load against the specified equipment capacity and decide if the lift is safe. If the load exceeds the equipment's capacity, they will suggest appropriate actions (e.g., use a different piece of equipment, reduce the load).

Group Discussion: Once completed, each group will explain how they confirmed the load weight did not exceed the equipment's capacity and what steps they would take if the load exceeded limits.

### 9.5.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 9.5.7. Summary

#### **Load weight not over the capacity of the equipment.**

It is essential to ensure that the weight of the load being lifted does not exceed the rated capacity of the equipment. Overloading equipment may cause instability, failure, and accidents. This step requires calculating the weight of the load accurately and comparing it with the specified capacity of the equipment. If the load exceeds the capacity, it may be necessary to reduce the load, use other equipment, or redistribute the weight to ensure a safe lifting operation.

#### **Available and Used Shall Be Load Charts and Equipment Manuals**

Load charts and equipment manuals are very essential for the safe performance of lifting operations. Load charts provide the information that one would need in regard to the maximum lifting capacity of the lifting equipment under specific conditions such as boom angle, radius, and load height. Equipment manuals provide the guidelines for how to operate, maintain, and safely use the equipment. By having these documents easily available and following them properly, overloading is prevented, and equipment is used as it should be, which then leads to efficient and safe lifting operations.

## Compliance with Regulatory Standards and Safety Protocols

Adhering to established regulatory standards for safety and set protocols is inevitable in ensuring workers are safe enough with the lifting tasks. This applies to the performance of all acts of lifting which should be directed by national safety regulations, international standards, in this case OSHA, and ISO standards within the company regarding safety. Those standards may even include equipment verification, operator checking, safe methods of working as well as their PPE. Regularly verifying compliance helps reduce the risk of accidents, ensures legal requirements are met, and promotes overall safety and operational efficiency.

### 9.5.8. Exercise

1. Where should load charts and equipment manuals be located during lifting operations?
  - a) In the operator's cabin only
  - b) In an office away from the worksite
  - c) They should be easily accessible to the operator, crew, and supervisors
  - d) Only with the equipment maintenance team
2. What information can be found in a load chart for lifting equipment?
  - a) Maximum lifting capacity based on various conditions
  - b) Manufacturer's warranty details
  - c) Operator's salary guidelines
  - d) Personal protective equipment (PPE) requirements
3. It is not necessary to have load charts and equipment manuals on-site as long as the equipment has been inspected recently. (T/F)
4. Regulatory standards and safety protocols are optional guidelines that can be followed at the discretion of the operator. (T/F)
5. Load charts and equipment manuals should be \_\_\_\_\_ so that they can be referenced during lifting operations to ensure safe practices.
6. Regulatory standards and safety protocols provide guidelines to ensure that lifting operations are \_\_\_\_\_ and comply with legal requirements.

## 10. Unit 10 NOS 9 : SSD/N0335 v1.0 : Communication and Team

### Coordination in Lifting Operations

#### 10.1. Key Learning Outcomes

- Communicate clearly using hand signals, radios, and verbal instructions.
- Ensure smooth coordination among crane operators, riggers, and supervisors.
- Manage conflicts and maintain effective teamwork.
- Conduct pre- and post-operation briefings to align team members.
- Promote a culture of open communication and safety compliance.

#### 10.2. Unit 10.1. Use Effective Communication Tools and Techniques

##### 10.2.1. Unit Objectives

At the end of this unit, students will be able to:

- To learn the correct hand signals and communication protocols for various operations, ensuring clear and efficient coordination between team members.

- To learn how to check for clear communication, using feedback or acknowledgment signals, to ensure all parties are aligned on the task
- To learn the importance of immediate communication to prevent accidents and ensure the safety of the team during lifting operations.

### 10.2.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 10.2.3. Say

- Describe about correct hand signals and communication protocols
- Describe about importance of immediate communication to prevent accidents

### 10.2.4. Explain

- Describe about correct hand signals and communication protocols
- Describe about importance of immediate communication to prevent accidents

### 10.2.5. Role Play

Divide participants into small groups. Assign roles: crane operator, rigger, supervisor, and other team members.

Provide each group with a lifting operation scenario, such as "lifting a heavy load from one point to another" or "suspending a load at a specific height."

The crane operator will receive instructions via hand signals, radio, and verbal instructions from the team.

The supervisor will communicate risks (e.g., potential wind or load shifting) and changes (e.g., the load needs to be moved more slowly) immediately to the team.

Each group will perform the operation, and the supervisor will ensure that all team members acknowledge the instructions and communicate effectively using the assigned methods (hand signals, radio, verbal).

### 10.2.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 10.2.7. Summary

**Use proper hand signals, radios, or voice commands during operations.**

Clear, effective communication is essential for safe and efficient lifting operations. The performance criterion calls for appropriate methods of communication in the form of hand signals, radio, or verbal instructions while performing the operation. The hand signals are applied for simple and clear messages that can be read from a distance where it becomes impossible to communicate vocally. Radios facilitate instant two-way communication among team members in very noisy environments. All oral instructions should be clear and state the task each team member needs to perform. Effective use of a communication tool will ensure that the operation of lifting is accomplished safely and without any complications.

### **All Instructions Shall Be Clearly Communicated and Comprehended and Acknowledged by the Team**

This criterion emphasizes the fact that all instructions should be verified to ensure that the team members understand and acknowledge them. Mistakes and risks of safety arise from misunderstandings or unclear instructions. Team members should confirm whether they have received and understood the instructions, either verbally or by hand signals. Acknowledgment and confirmation of instructions ensure uniformity among the team, avoid confusion, and ensure safety in the lifting operation.

### **Communicate any changes or risks to concerned personnel in time**

The change or risks involved in the process of lifting can be due to malfunctions in equipment, change in weather, or hazards on site. In this performance criterion, the necessity to inform all people involved of changes or risks during the lifting operations immediately is highly valued. Prompt and clear communication makes sure the entire team knows what potential dangers there are so they can take measures to minimize such risks. Instant communication will prioritize safety, so the operation continues without undue delay or accident.

### **10.2.8. Exercise**

1. Which of the following is the primary method for communicating during operations when verbal communication is not possible?
  - a) Using a whistle
  - b) Using hand signals
  - c) Using body gestures
  - d) Using facial expressions
2. When should changes in plans or new risks be communicated to the team?
  - a) After the operation has been completed
  - b) Immediately upon discovery
  - c) At the end of the day
  - d) Only if someone asks for updates
3. True or False: It is acceptable to wait until a break in operations to inform the team about new risks.
4. True or False: Immediate communication of risks and changes to relevant personnel is crucial to maintain safety and effectiveness in operations.
5. Any significant changes or risks should be communicated \_\_\_\_\_ to ensure safety and coordination.
6. Prompt communication about changes in the operation can help to mitigate \_\_\_\_\_ to personnel.

## **11. Unit11 NOS 10: SSD/N0336 v1.0 : Health, Hygiene and Environment Protocols for Lifting & Rigging Operations**

### **11.1. Key Learning Outcomes**

- Promote personal hygiene, health practices, and PPE usage.
- Ensure compliance with environmental health protocols to reduce hazards.
- Manage psychological health through stress management and work-life balance.
- Identify and mitigate environmental risks (e.g., weather conditions, noise, and pollution).
- Conduct health assessments and safety briefings to maintain readiness.

## 11.2. Unit 11.1. Promote Personal Health, Hygiene, and PPE Usage

### 11.2.1. Unit Objectives

At the end of this unit, students will be able to:

- To understand why maintaining personal hygiene protocols leads to a safe and healthy working environment.
- To identify and implement hygiene practices appropriately to adhere to regulations and prevent illness at work.
- To monitor and enforce proper use of PPE through routine inspections and checks.
- To conduct regular health checks to assess workers' fitness for duty and act on any medical concerns that might have an impact on safety.

### 11.2.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 11.2.3. Say

- Describe about personal hygiene protocols
- Describe about good hygiene practices
- Describe about monitor and enforce proper use of PPE
- Describe about process of health assessment

### 11.2.4. Explain

- Describe about personal hygiene protocols
- Describe about good hygiene practices
- Describe about monitor and enforce proper use of PPE
- Describe about process of health assessment

### 11.2.5. Role Play

Create roleplay scenarios where one participant is the supervisor, and others are workers. The supervisor's task is to ensure compliance with PPE requirements before beginning a lifting or rigging operation.

After the roleplay, discuss the importance of regular compliance checks and strategies for maintaining PPE standards.

### 11.2.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.

- Ensure that every participant answers all the questions

### 11.2.7. Summary

#### **Ensure workers follow personal hygiene protocols at the worksite**

Personal hygiene forms the core of a safe and healthy workplace. Hygiene practices such as handwashing or using hand sanitizers, hygiene maintenance in personnel spaces, among others should be followed. This will ensure that the place of work will not be risky for illnesses and infections. Ensuring general well-being, uniform application, and integration into the daily operations falls under the supervisory role.

#### **Monitor adherence to PPE standards in lifting and rigging**

Personal protective equipment is of great importance regarding the safety of workers involved in lifting and rigging. The supervisor should ensure that the correct PPE is worn, such as helmets, gloves, safety boots, and harnesses, to avoid injuries. Such checks and enforcement of the use of PPE will be required to minimize accidents, protect the worker from physical harm, and ensure a safe working environment with which to perform hazardous tasks.

#### **Periodic health examinations to determine fitness for duty**

Regular health checks ensure that employees are fit for duty, especially in physically demanding tasks. These include physical examinations, mental health check-ups, and drug testing to detect potential health issues that would impact a worker's performance or safety. Supervisors ensure that, on a regular basis, health checks are conducted, and any concerns are addressed promptly in the prevention of workplace accidents and ensure all workers are capable of safely performing their tasks.

### 11.2.8. Exercise

1. What is the primary purpose of Personal Protective Equipment (PPE) during lifting and rigging operations?
  - a) To increase worker comfort
  - b) To minimize the risk of injury
  - c) To enhance the appearance of workers
  - d) To make lifting tasks easier
2. PPE for lifting and rigging operations includes items like helmets, gloves, \_\_\_\_\_, and safety boots.
3. Regular health assessments are important to determine whether workers are \_\_\_\_\_ for physically demanding tasks.
4. Wearing the correct PPE is essential for protecting workers from injuries during lifting and rigging operations. (T/F)
5. Health assessments to ensure fitness for duty should only be conducted once a year. (T/F)

## 11.3. Unit 11.2. Manage Environmental Health and Safety Protocols

### 11.3.1. Unit Objectives

**At the end of this unit, students will be able to:**

- To identify and recognize the general types of environmental hazards: heat, noise, air pollution.
- To implement effective controls and strategies to mitigate environmental risks during operations.
- To ensure compliance with the waste management and pollution control procedures.
- To monitor and audit environmental health and safety activities against established protocols to ensure continuation.

### 11.3.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 11.3.3. Say

- Describe about types of environmental hazards and its control strategies
- Describe about effective controls and strategies to mitigate environmental risks during operations
- Describe about waste management and pollution control procedures

### 11.3.4. Explain

- Describe about types of environmental hazards and its control strategies
- Describe about effective controls and strategies to mitigate environmental risks during operations
- Describe about waste management and pollution control procedures

### 11.3.5. Activity

Split participants into small groups.

Provide each group with scenario cards describing different workplace environments (e.g., factory with high noise, construction site in a hot climate, warehouse with poor air ventilation).

Ask each group to identify potential environmental hazards in their given scenario.

After 10 minutes, each group presents their findings to the class, highlighting the types of hazards present in their scenario.

Discuss possible additional environmental hazards that might be overlooked.

### 11.3.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 11.3.7. Summary

#### **Identify environmental hazards (heat, noise, air pollution)**

Identify any environmental hazards that can guarantee a risk-free workplace for employees. Some of the hazards include heat stress, over noise, and air pollution. Heat hazards are linked to heat exhaustion or heatstroke, causing deafness through noise, and respiratory problems through air pollution. This would require assessing the work environment, equipment, and tasks to identify possible health risks for workers.

#### **Control Measures to Prevent Environmental Hazards**

Control measures are very important once hazards have been identified, and they reduce or eliminate the risk of these hazards. These controls can be in the form of:

Engineering controls. For example, ventilation systems may be used to improve air quality, noise barriers, or cooling systems for hot environments.

Administrative controls. For instance, rotating workers can minimize exposure to heat, adjusting work schedules to minimize exposure to high noise levels.

PPE, for instance, ear protectors, respirators, and cooling vests

Minimize the level of exposure to environmental hazards on the worker but ensure that their productivity is retained.

#### **Monitor implementation of procedures regarding waste management and pollution control.**

Monitoring compliance is important in ensuring that environmental protection procedures are consistently implemented. These include waste management practices, such as sorting, recycling, and proper disposal of waste, as well as pollution control measures, including emission reduction and control of water and air pollutants. Compliance checks and audits regularly ensure that all environmental health and safety protocols are being followed and help point out areas for improvement.

#### **11.3.8. Exercise**

1. Which of the following is NOT considered an environmental hazard?

- a) Heat stress
- b) Noise exposure
- c) Physical injury from lifting
- d) Air pollution

2. Which of the following is an example of an administrative control to mitigate heat stress?

- a) Installing air conditioning units
- b) Providing cooling vests
- c) Rotating workers to avoid prolonged heat exposure
- d) Reducing the number of workers on-site

3. Environmental hazards such as heat, noise, and air pollution only affect workers when they are in direct contact with the hazardous source. (T/F)

4. Noise exposure can be controlled by providing workers with ear protection and installing noise barriers. (T/F)

5. The first step in managing environmental health and safety protocols is to \_\_\_\_\_ environmental hazards such as heat, noise, and air pollution.

6. To mitigate environmental risks during operations, companies may use a combination of engineering controls, administrative controls, and \_\_\_\_\_.

### **11.4. Unit 11.3. Ensure Psychological Health and Stress Management**

#### **11.4.1. Unit Objectives**

**At the end of this unit, students will be able to:**

- To identify early signs of stress, fatigue, and burnout in workers by recognizing behavioural, emotional, and physical indicators that could signal a decline in mental well-being.
- To provide workers with access to mental health support
- To address psychological issues and get help with stress management and recovery.
- To equip with tools and strategies for early recognition and intervention of psychological health concerns, so that the workforce is healthier and more productive.

#### **11.4.2. Resources**

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.

- Activities (role plays)

#### 11.4.3. Say

- Describe about signs of stress, fatigue, and burnout and physical indicators for mental health.
- Describe about workers with access to mental health support
- Describe about stress management and recovery strategy

#### 11.4.4. Explain

- Describe about signs of stress, fatigue, and burnout and physical indicators for mental health.
- Describe about workers with access to mental health support
- Describe about stress management and recovery strategy

#### 11.4.5. Activity

Divide participants into small groups and ask them to discuss and list signs of stress, fatigue, and burnout they've observed in themselves or others.

Each group share their findings with the class.

Record the key signs on the whiteboard.

#### 11.4.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

#### 11.4.7. Summary

Psychological well-being and stress management at the workplace are essential to maintaining a healthy and productive workforce.

##### **Early symptoms of stress, fatigue, and burnout**

It should be identified to pinpoint those who require support. Early intervention prevents more serious mental health issues from arising, leading to a healthier, more effective workforce.

It is thus essential to support the employees by providing them with access to resources such as counselling services and employee assistance programs,

##### **Provide access to mental health support and counselling services**

Such access is likely to urge employees to seek help before their mental health problems worsen and creates a support environment that encourages emotional and psychological well-being.

##### **A major strategy for sustaining psychological well-being is to support healthy work-life balance**

By encouraging this balance of professional and personal responsibilities on the part of the employees, there is a decrease in stress and burnout. In general, it contributes to more improved mental well-being. This promotion of psychological health at work can contribute to job satisfaction, reduction in absenteeism, and increased productivity.

### 11.4.8. Exercise

1. What is the primary purpose of providing access to mental health support and counselling services for workers?

- a) To help workers solve work-related problems
- b) To assist in managing stress and improving psychological well-being
- c) To increase company profits
- d) To enhance physical health

2. Which of the following is an effective way to promote work-life balance?

- a) Encouraging workers to work overtime frequently
- b) Implementing flexible work hours or remote work options
- c) Expecting workers to check emails during personal time
- d) Reducing breaks during the workday

3. Providing mental health support and counselling services is only necessary for workers who have already been diagnosed with a mental health condition. (T/F)

4. A work-life balance that promotes personal time and relaxation helps reduce stress and improve overall mental health. (T/F)

5. Providing access to \_\_\_\_\_ support and counselling services is crucial to help employees manage mental health challenges effectively.

6. Encouraging a \_\_\_\_\_ work-life balance helps workers avoid burnout and maintain mental well-being by allowing time for personal and family activities.

## 11.5. Unit 11.4. Conduct Health and Safety Briefings

### 11.5.1. Unit Objectives

**At the end of this unit, students will be able to:**

- To understand about hazards and safety protocols
- To understand how to review health-related incidents to improve safety procedures.
- To understand their roles in emergencies

### 11.5.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 11.5.3. Say

- Describe about hazards and safety protocols
- Describe about how to review health-related incidents to improve safety procedures.
- Describe about their roles in emergencies

#### 11.5.4. Explain

- Describe about hazards and safety protocols
- Describe about how to review health-related incidents to improve safety procedures.
- Describe about their roles in emergencies

#### 11.5.5. Activity

Divide participants into small groups (3–5 people per group).

Assign each group a specific workplace scenario (e.g., a construction site, laboratory, factory) with relevant hazards (e.g., machinery, chemicals, extreme weather).

Ask each group to prepare and present a brief health and safety briefing for the rest of the class, including key points about potential hazards, safety measures, and emergency procedures.

After each presentation, provide feedback on how to improve the clarity and effectiveness of their briefings.

#### 11.5.6. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

#### 11.5.7. Summary

Conduct regular health and safety briefings

The conduct of regular health and safety briefings is very essential in sensitizing the workers to potential hazards, safety procedures, and emergency procedures. These briefings will make sure that the employees are knowledgeable about how accidents can be prevented and how to respond in case of emergencies.

Training in Handling Emergencies

The employees should be trained to respond appropriately in case of health and environmental risk-related emergencies, such as chemical spills, fires, or medical cases. This enables the employee to respond immediately with safety and saves harm during the crisis.

Prepare documents and review health-related incidents

Critical to understanding the causes of health-related incidents, analysing responses, and developing improvements for future safety, this process of documenting and review is essential. The entire organization learns from its mistakes by observing past incidents, further refining emergency procedures, and preventive measures, thus decreasing the possibility of such events in the future.

#### 11.5.8. Exercise

What is the main purpose of organizing regular health and safety briefings?

- To entertain workers
- To raise awareness about hazards and ensure safety protocols are followed
- To discuss the company's profit margins
- To reduce the number of workers on-site

Which of the following should be included in training on handling emergencies related to health and environmental risks?

- Company financials
- Identifying health hazards and appropriate emergency responses

- c) Work performance reviews
- d) Office management strategies

Providing training on handling emergencies helps workers respond effectively to health and environmental risks.

It is not necessary to review health-related incidents if the response was successful.

Emergency response training should focus on teaching workers how to handle \_\_\_\_\_ situations involving health and environmental risks.

After a health-related incident, reviewing and \_\_\_\_\_ the event helps improve future safety procedures and prevent similar incidents.

## 12. Unit 10 NOS 9: Employability Skills (DGT/VSQ/N0102)

### 12.1. Key Learning Outcomes

- Introduction to Employability Skills Constitutional values - Citizenship
- Becoming a Professional in the 21st Century Basic English Skills
- Career Development & Goal Setting Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy Essential Digital Skills
- Entrepreneurship Customer Service
- Getting ready for Apprenticeship & Jobs

### 12.2. Unit 10.1: Preparing for Employment & Self Employment

#### 12.2.1. Unit Objectives

**At the end of this unit, students will be able to**

1. **Develop Job Readiness Skills:**
2. **Create Effective Job Search Strategies:.**
3. **Prepare for job interviews and networking opportunities.**
4. **Identify potential self-employment ideas and business opportunities.**
5. **Understand Employment Rights and Responsibilities:**
6. **Enhance Personal Branding:**
7. **Develop Financial and Organizational Skills:**

#### 12.2.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 12.2.3. Say

Tell the participants that when an interviewer asks you to say something about yourself, he/she is not asking you to present your life history.

- Introduction should be short and crisp, and should present you in a positive light. It should include the following points:

- o Any work experience that you might have
- o A brief summary of your educational qualifications
- o Your strengths and achievements
- o Any special projects that you might have been part of

- The following topics should be avoided during an introduction:

- o Detailed description of your family (unless you are specifically asked to do so)
- o Too much information about your weaknesses
- o Information that is not true

### 12.2.4. Do

- Congratulate each participant for making their first attempt towards creating an effective resume.
- As a follow up activity, you can suggest them to prepare their own resume and show it to you the next day.

### 12.2.5. Role Play

Conduct a role play for the situation given.

#### Role Play –

- The interviewer will start by asking the interviewee a few generic questions such as:

- o What is your name?
- o Tell me something about yourself?
- o Can you tell me something about your family?

- Then, at the end of the interview, ask the interviewee:

- o There are over 200 people who have applied for this job, some with excellent work experience.

Why should I hire you?

### 12.2.6. Notes for Facilitation

Summarize the important points and terms explained in the session.

- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 12.2.7. Summary

#### Job Readiness:

Develop skills for seeking and securing employment or starting a business.

#### Job Search Tools:

Create a professional resume, cover letter, and online presence.

Prepare for job interviews and networking.

#### **Self-Employment:**

Identify and explore potential self-employment or business ideas.

Understand the basics of starting and managing a small business.

#### **Workplace Rights**

Learn about employment laws, rights, and responsibilities.

#### **Personal Branding:**

Build a strong personal brand for career or business growth.

#### **Financial Planning:**

Develop essential financial and organizational skills for employment or entrepreneurship.

### **12.2.8. Exercise**

1. What is the first step in preparing for employment?

- A) Writing a resignation letter
- B) Creating a resume
- C) Opening a business
- D) Networking with friend

2. Which of the following is NOT typically required for self-employment?

- A) A business plan
- B) An employer to answer to
- C) Financial management skills
- D) Marketing and sales strategies

3. What should be included in a self-employment business plan?

- A) The business idea and goals
- B) A list of personal contacts
- C) A resume
- D) A job offer letter

4. True or False: In self-employment, you are responsible for your own business operations, including financial management and legal compliance.

5. True or False: Having relevant qualifications and work experience is the only factor to consider when preparing for employment.

6. True or False: Personal branding is important for both self-employment and traditional employment opportunities.

## **12.3. Unit 10.2. Understanding Entrepreneurship**

### **12.3.1. Unit Objectives**

**At the end of this unit, students will be able to**

1. Discuss the concept of entrepreneurship
2. Discuss the importance of entrepreneurship
3. Discuss the characteristics of an entrepreneur

4. Describe the different types of enterprises
5. List the qualities of an effective leader
6. Discuss the benefits of effective leadership
7. List the traits of an effective team
8. Discuss the importance of listening effectively
9. Discuss how to listen effectively
10. Discuss the importance of speaking effectively
11. Discuss how to speak effectively
12. Discuss how to solve problems
13. List the important problem solving traits
14. Discuss ways to assess problem solving skills

### 12.3.2. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

### 12.3.3. Say

Let's start this session with some interesting questions about Indian entrepreneurs

### 12.3.4. Do

Tell them that you will ask them few questions about a few entrepreneurs.

- Divide the class in to two groups.
- In turns ask the quiz questions to the groups.
- If the answer is incorrect pass the question to the other group.
- Share the answer if the groups are not able to answer.
- Congratulate the participants who answered correctly

### 12.3.5. Team Activity

**Divide the class into small teams (4-5 participants per team).**

Each team needs to come up with a unique business idea. Encourage participants to think creatively, focusing on solving a real-world problem.

Teams should discuss and finalize their business idea

#### **Business Plan Development**

Teams will work together to develop a simple business plan for their idea. The plan should cover the following key points:

Business Idea: What is the product or service? How does it solve a problem?

Target Market: Who are the customers? What are their needs?

Unique Value Proposition: Why is the business idea different or better than others in the market?

Revenue Model: How will the business make money (e.g., sales, subscriptions, ads)?

Marketing Strategy: How will the business attract customers?

Launch Plan: How will they introduce the business to the mark

### 12.3.6. Notes for Facilitation

Summarize the important points and terms explained in the session.

- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

### 12.3.7. Summary

Close the discussion by summarizing about the opportunities for entrepreneurs in India

### 12.3.8. Exercise

#### 1. Which of the following is a good practice for writing a professional email?

- A) Using a casual tone and slang
- B) Including a clear subject line
- C) Writing long paragraphs without breaks
- D) Not using a greeting

#### 2. Which research method is often used to assess market opportunities for a new business?

- A) Historical analysis
- B) Surveys and questionnaires
- C) Personal opinions
- D) Guesswork

#### 3. Which of the following is a primary motivation for entrepreneurs?

- A) Seeking a stable salary
- B) Solving problems and creating value
- C) Avoiding risk
- D) Working within a corporate structure

4. True or False: An entrepreneur's role in the economy is limited to running a business for profit.

5. True or False: The entrepreneurial mindset involves risk-taking, resilience, and the ability to adapt to challenges.

6. True or False: Entrepreneurship only applies to individuals who start their own businesses and does not include individuals who work within large corporations.