

Facilitator Guidebook Manager (OSHE)



MANAGER (OSHE)

Sector:- Cross Sectoral

Sub-Sector:- Hydrocarbon, Iron & steel, Mining, Power, Automotive, Construction, Chemicals & Petrochemicals, and others.

Occupation:- Occupational Safety Health & Environment (OSHE) Engineering & Management

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The Facilitator Guidebook for **Manager (OSHE), SSD/Q0106**, 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 focus on safety across various industries is driving a surge in the demand for qualified MANAGER (OSHE). This heightened need is resulting in a greater requirement for trained professionals in the field. As a result, there is an escalating necessity for trainers to prepare individuals with the essential skills to become competent MANAGER (OSHE).

This Facilitator Guide is designed for providing skill training and /or upgrading the knowledge level of the Trainees to take up the job of an “Trainer” in the Cross Sectoral Sector.

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.

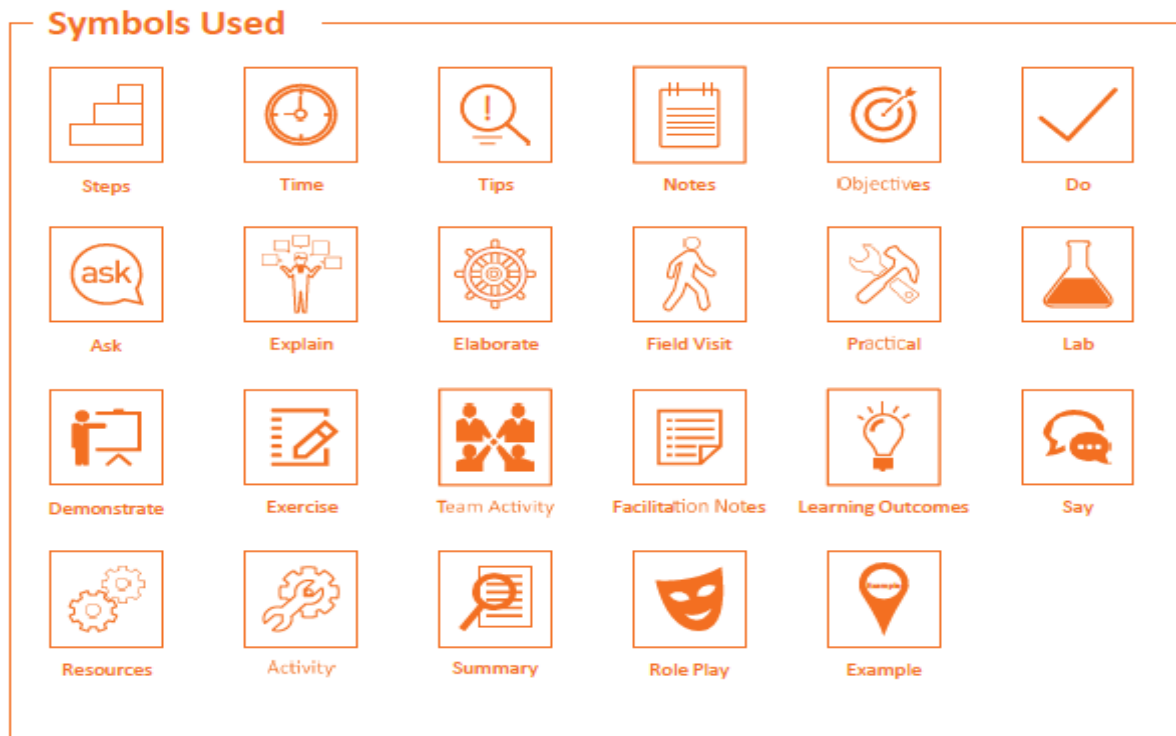
1. **SSD/VSQ/N0132: Occupational Safety, Health, and Environment (OSHE) Management**
2. **SSD/VSQ/N0133: Hazard Identification & Risk Analysis**
3. **SSD/VSQ/N0121: Fire Safety and Emergency Management Plan**
4. **SSD/VSQ/N0122: Hazard Mitigation Methodologies**
5. **SSD/VSQ/N0123: Hazards and Risk Perception**
6. **SSD/VSQ/N0134: Statutes & Legislative requirements in Health & Safety**
7. **SSD/VSQ/N0124: Statutes and Legislative requirements in OSHE (International)**
8. **SSD/VSQ/N0125: Safety Auditing and Inspection**
9. **SSD/VSQ/N0112: Pollution & Environment Management, Global warming, and sustainability.**
10. **SSD/VSQ/N0104: Plan, Organize and Emergency protocols**
11. **DGT/VSQ/N0102: Employability Skills (60 Hours)**

The guidebook provides detailed insights on how facilitators can engage with participants, assess their training requirements, and convey essential concepts pertaining to Occupational Safety Health & Environment management System (**OSHEMS**). It guarantees that facilitators address all necessary subjects effectively, achieving the training goals within the allotted time.

At the start of each unit, key learning objectives for each National Occupational Standard (NOS) are presented, assisting facilitators in navigating the training process. Additionally, the symbols utilized in this guidebook are clarified to enhance facilitators' comprehension of the materials.

This guidebook serves as an extensive resource for trainers, ensuring they are adequately prepared to conduct effective safety audit training.

Symbols Used



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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 Manager

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:

- Describe about the Hydrocarbon sector in India
- Describe about the Iron & Steel sector in India
- Describe about the Mining sector in India
- Describe about the Power sector in India
- Describe about the Automotive sector in India
- Describe about the Construction sector in India
- Describe about the Chemicals & Petrochemicals in India
- Describe how each sub-sector contributes to skill development
- 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

1. 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 Manager (OSHE)

1.3.1. Unit Objectives

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

- Identify roles and responsibilities of Manager (OSHE)
- Identify essential skills of Manager (OSHE)

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 Manager (OSHE) outlining their personal attributes to the participants
- Provide the participants with a List of Roles and Responsibilities of Manager (OSHE)
- Talk about the skills and knowledge which are essential to become a Manager (OSHE)

1.3.5. Explain

Describe about the roles and responsibility of Manager (OSHE)

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 Manager (OSHE)
- 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

- 1) **Leadership and Supervision:** Lead, manage, and supervise the OSHE team to ensure effective safety and environmental performance.
- 2) **Policy Implementation and Compliance:** Develop and implement OSHE policies, procedures, and programs in alignment with legal and industry standards.
- 3) **Risk Assessment and Hazard Identification:** Conduct regular risk assessments and audits to identify workplace hazards. Implement measures to control, eliminate, or reduce risks, ensuring a safe working environment
- 4) **Accident Investigation and Reporting:** Prepare and submit detailed reports on incidents to management and regulatory authorities. Ensure that proper documentation is maintained for all safety-related incidents.

- 5) **Emergency Response Planning:** Develop and implement emergency response plans, ensuring that all employees are trained in emergency procedures.
- 6) **Training and Development:** Organize and deliver OSHE-related training programs to employees at all levels. Ensure training is up to date and relevant to the latest safety protocols and environmental standards. Evaluate the effectiveness of training programs and modify them as needed.
- 7) **Environmental Management:** Ensure compliance with environmental laws and regulations. Manage waste disposal, recycling, and other eco-friendly practices
- 8) **Monitoring and Reporting:** Regularly monitor safety performance and environmental impact through audits, inspections, and safety checks. Provide detailed monthly, quarterly, and annual reports on safety performance and compliance
- 9) **Continuous Improvement:** Promote a culture of continuous improvement by actively seeking feedback and suggestions from employees.
- 10) **Collaboration with Other Departments:** Work closely with other departments (e.g., HR, production, maintenance) to integrate safety and environmental considerations into daily operations.
- 11) **Budget and Resource Management:** Optimize resource allocation to meet OSHE objectives within budget constraints.

1.3.10. Exercise

1. What is the primary responsibility of a manager in OSHE?

- a) To oversee financial operations
- b) To ensure the safety and health of employees in the workplace
- c) To supervise employee performance
- d) To handle marketing and sales strategies

2. Which of the following is NOT a role of a manager in OSHE?

- a) Identifying and assessing workplace hazards
- b) Implementing safety policies and procedures
- c) Conducting job interviews for new employees
- d) Ensuring compliance with health and safety regulations

3. A manager in OSHE is responsible for _____ workplace hazards to ensure the safety and well-being of employees.

4. The manager should ensure that employees are properly trained in _____ procedures to avoid accidents and injuries.

5. It is a manager's role to implement safety measures and create a safe working environment.(T/F)

6. Managers are not required to ensure that safety equipment is properly used or maintained.(T/F)

2. Unit 2 NOS 1: SSD/VSQ/N0132: Occupational Safety, Health, and Environment (OSHE) Management

2.1. Key Learning Outcomes

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

- Understand health & safety requirements, financial losses of an organization because of an accident.
- Understand safety policy formulation and health & safety objectives.
- Identify hazards at the workplace.
- Understand different classes of fire, evacuations, fire drills, use of PPEs.
- Onboard and manage contractors to comply with statutory requirements in occupational OSHE

2.2. Unit 2.1: Health & Safety at workplace

2.2.1. Unit Objectives

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

- Understand the concept of Health, Safety and Environment management at the workplace, its importance and the moral, financial and legal reasons for health and safety at the workplace.
- Understand “Accident Cost- Iceberg” theory of direct and indirect cost incurred from an incident.
- Understand the employer responsibilities in providing safe working conditions and the employee rights & responsibilities at a workplace, safety culture, its indicators and role of International Labour Organisation in health & safety.
- Understand safety Policy, the general statement of intent in a safety policy, its aim, objectives and “SMART” concept of goal setting

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

- What is Health, Safety and Environment management
- Why Safety?
- Describe “Accident Cost- Iceberg” theory
- What is Employer’s responsibilities
- What is safety Policy

2.2.4. Explain

- Describe Health, Safety and Environment management and its component

- Describe Accident Cost- Iceberg” theory
- Describe Employer’s responsibilities
- Describe employee rights & responsibilities at a workplace
- Describe safety culture & its indicators
- Describe role of International Labour Organisation in health & safety
- Describe safety Policy

2.2.5. Activity

Health & Safety at the Workplace

- Distribute the Iceberg Diagram to each participant or group.
- Ask participant to break down the costs of an accident into direct and indirect costs based on the Iceberg Theory.
- Direct costs: Medical expenses, workers' compensation, repairs, etc.
- Indirect costs: Lost productivity, training costs for replacements, damage to reputation, legal fees, etc.

2.2.6. Role-Playing Exercise:

- Divide the class into pairs. One person will take on the role of the employer and the other the employee.
- Provide the pairs with a scenario in which a safety issue arises in the workplace (e.g., unsafe working conditions, a worker’s right to stop unsafe work).
- Ask them to role-play the interaction where the employer explains their responsibilities and the employee asserts their rights and responsibilities.
- After the role-play, ask the class to reflect on what was discussed and highlight any key learning points.

2.2.7. 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.

2.2.8. Summary

1. Health, Safety, and Environment (HSE) Management:

- HSE management focuses on maintaining a safe and healthy workplace by preventing accidents and promoting environmental sustainability.
- Importance: Ensures the well-being of employees, compliance with regulations, and minimizes financial loss from accidents.
- Reasons for Safety:
 - A. Moral: Duty to protect workers from harm.
 - B. Financial: Avoiding costs related to accidents (e.g., medical expenses, compensation, lost productivity).
 - C. Legal: Compliance with safety laws to avoid fines and legal issues.

2. Accident Cost – Iceberg Theory:

- Direct Costs: Visible costs like medical bills, compensation, and equipment repair.
- Indirect Costs: Hidden costs like loss of productivity, legal fees, and damage to company reputation.

3. Employer Responsibilities:

- Ensure safe working conditions, provide necessary training, and equip workers with protective gear.
- Maintain safety policies and perform regular safety audits.

4. Employee Rights & Responsibilities:

- Rights: Right to work in a safe environment and report hazards without fear of retaliation.
- Responsibilities: Follow safety procedures, use protective equipment, and report unsafe conditions.

5. Safety Culture:

- A strong safety culture encourages active participation from both employers and employees to promote a safe working environment.
- Indicators: Open communication, adherence to safety procedures, and continuous safety training.

6. Role of International Labour Organisation (ILO):

Sets global standards and guidelines for workplace safety and health to protect workers worldwide.

7. Safety Policy and SMART Goals:

- Safety Policy: A statement outlining the company's commitment to health and safety, including aims and objectives.
- SMART Goals: Specific, Measurable, Achievable, Relevant, and Time-bound goals set to improve workplace safety (e.g., reducing accidents by a certain percentage in a specific time frame).

2.2.9. Exercise

1. What are the three primary reasons for implementing health and safety at the workplace?

- Moral, Environmental, Legal
- Financial, Moral, Legal
- Legal, Technological, Environmental
- Financial, Technological, Moral

2. The “Accident Cost - Iceberg” theory highlights which of the following?

- The hidden and visible costs of accidents
- The physical and emotional impact of accidents
- The visible impact of training
- The role of environment in accidents

3. What is the role of the International Labour Organisation (ILO) in workplace safety?

- Provides financial support for safety training
- Sets global safety standards and promotes safety culture
- Implements emergency evacuation plans
- Supplies equipment to reduce accidents

4. Every employer is required to provide a _____ work environment to ensure the health and safety of all employees.

5. It is important for employees to report any _____ immediately to their supervisor to prevent accidents

6. It is the employer's responsibility to ensure a safe working environment for all employees.(T/F)

7. Employees should immediately report any unsafe conditions or hazards to their supervisor. (T/F)

2.3. Unit 2.2: PDCA Cycle & Safety training

2.3.1. Unit Objectives

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

- Understand the requirement of Plan-Do-Check-Act (PDCA) Cycle in safety management system
- Understand the need of training, the contents of induction training & competent persons at the workplace
- Understand “Toolbox talk” and “Induction training”.
- Understand Concept of gas testing using – LEL sensor, O2 sensor, H2S sensor, Co-Sensor

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

- What do you understand by Plan-Do-Check-Act (PDCA) Cycle in safety management system?
- Why training is necessary?
- What should be included in “Toolbox talk”

2.3.4. Explain

- Describe Plan-Do-Check-Act (PDCA) Cycle in safety management system and its stage
- Describe different kind of training and competency
- Describe about Toolbox talk
- Describe Concept of gas testing

2.3.5. Activity

Divide the class into small groups and give each group a scenario related to workplace safety (e.g., handling chemical spills, machinery maintenance, or a fire drill).

Task:

In their groups, students must apply the PDCA cycle to the scenario, focusing on the Plan and Do stages.

Each group will:

Identify key safety objectives (Plan stage).

Create a simple plan to address the safety issue (e.g., implementing PPE or specific safety protocols).

Discuss how they would implement the plan (Do stage).

After 10 minutes, each group will present their plan and actions.

Class Discussion:

Discuss the Check and Act stages. What methods can be used to evaluate if the plan worked, and what corrective actions can be taken if the plan was unsuccessful?

2.3.6. Role-Playing Exercise:

Split students into pairs. One person will take the role of a trainer, and the other will be the trainee.

The trainer will conduct a short Toolbox Talk on a safety topic (e.g., fire safety, lifting techniques) or deliver a portion of an Induction Training.

After 5 minutes, swap roles.

Class Feedback:

After each role-play, allow the class to provide feedback on the effectiveness of the training and suggest improvements (e.g., clarity, engagement, essential information).

2.3.7. 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.

2.3.8. Summary

1. PDCA Cycle (Plan-Do-Check-Act)

The PDCA Cycle (Plan-Do-Check-Act) serves as a structured method for enhancing safety management.

- Plan: Recognize safety concerns, establish goals, and create a strategic action plan.
- Do: Execute the safety measures and initiatives as outlined in the plan within the workplace.
- Check: Evaluate the effectiveness of the implemented actions and review overall performance.
- Act: Implement corrective measures to enhance safety protocols and standardize effective practices.

Grasping and utilizing the PDCA cycle is essential for fostering ongoing improvements in safety.

2. Training and Competence at the Workplace:

Induction Training: Introduces new employees to safety policies, procedures, hazard identification, and emergency response protocols.

Toolbox Talk: Short, focused safety discussions that reinforce specific safety topics to employees on the job.

Competence at the workplace refers to skills, knowledge, and abilities needed to perform tasks efficiently, contributing to organizational success

3. Gas Testing:

Learning how to use gas testing equipment (LEL sensor, O2 sensor, H2S sensor, CO sensor) is crucial in workplaces where hazardous gases may be present.

- LEL Sensor: Detects lower explosive limits to prevent fire or explosions.

- O2 Sensor: Measures oxygen levels to ensure sufficient oxygen is available for safe work conditions.
- H2S Sensor: Detects hydrogen sulphide, a toxic gas.
- CO Sensor: Monitors carbon monoxide levels to prevent poisoning.

2.3.9. Exercise

1. What does the “Plan” stage in the PDCA cycle focus on?

- Implementation of safety measures
- Planning safety objectives and goals
- Monitoring the effectiveness of actions
- Revising and improving processes

2. What is the primary purpose of a “Toolbox talk”?

- To distribute safety gear
- To discuss job-specific hazards and safety measures
- To provide formal safety training
- To conduct drills for emergency evacuation

3. In the Plan stage of the PDCA cycle, the focus is on identifying and analysing _____ related to workplace safety.

4. The Do stage in the PDCA cycle involves _____ the safety plan, which includes implementing necessary controls.

5. The PDCA cycle is an essential tool for continuously improving safety management systems.

6. The 'Do' stage of the PDCA cycle involves checking the effectiveness of the safety measures.

7. Toolbox talks are informal discussions aimed at increasing awareness of specific safety risks at the workplace.

8. Induction training is only required for new employees and not for existing employees.

2.4. Unit 2.3: Understanding Fire Accidents

2.4.1. Unit Objectives

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

- Understand basic definitions-Fire
- Understand the Fire triangle and classification fire.
- Understand the common reason for fire accidents.
- Understand types of fire-fighting equipment and its principle of operation,
- Understand the use of smoke detectors, fire alarm, emergency lighting, flashing light, sprinklers, and pressure requirements in fire hydrants, PPE's, SCBA (Self-contained breathing apparatus) and use of SCBA.
- Understand the requirements of emergency evacuation

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 Fire triangle , its component and classification fire.
- Describe types of fire-fighting equipment and its principle of operation
- Describe the fire detecting device
- Describe the requirements of emergency evacuation.

2.4.4. Explain

- Describe Fire triangle , its component and classification fire.
- Describe types of fire-fighting equipment and its principle of operation
- Describe the fire detecting device
- Describe the requirements of emergency evacuation.

2.4.5. Role-Playing Exercise:

Divide students into pairs or small groups. One person will act as a firefighter, and the other will role-play a fire emergency.

The firefighter must demonstrate the PASS technique using a model fire extinguisher (or simulated method if real equipment isn't available).

After each demonstration, ask students to discuss the effectiveness of the technique and correct any mistakes.

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

1. Basic Fire Definitions:

- Flammable Liquids: Liquids that ignite easily, like gasoline and alcohol.
- Combustible Matter/Liquids: Materials that catch fire at higher temperatures, such as oils and certain solvents.
- Combustible Gases: Gases that can burn when exposed to a flame, including propane and methane.
- Combustion: The chemical reaction in which a substance reacts with oxygen to release heat and light (fire).
- Oxygen Percentage in Air: Normal oxygen levels are around 21%. Changes in this can affect the fire behavior.
- Exothermic Reactions: Reactions that release heat, such as combustion.

- Endothermic Reactions: Reactions that absorb heat.
- Radiation: The transfer of heat through electromagnetic waves, such as heat from a fire.

2.Fire Triangle:

Fire requires three elements: Heat, Fuel, and Oxygen. Removing any of these elements will extinguish the fire.

3.Fire Classifications:

Fires are classified based on the type of material burning:

- Class A: Solid materials (wood, paper).
- Class B: Flammable liquids.
- Class C: Gaseous fires.
- Class D: Metal fires.
- Class K: Cooking oils and fats.

4.Common Causes of Fire Accidents:

Electrical faults, improperly stored flammable materials, human error, and negligence are common causes of fire accidents.

5. Fire-fighting Equipment:

Types of Fire Extinguishers: Water, foam, CO₂, and powder extinguishers are used for different fire classifications.

PASS Technique:

P: Pull the pin

A: Aim at the base of the fire

S: Squeeze the handle

S: Sweep from side to side

Fire Hydrants: Used for accessing water in fire-fighting operations.

6.Fire Safety Systems and PPE:

- Smoke Detectors: Alert when smoke is detected, triggering alarms.
- Fire Alarms: Sound or visual signals to alert people to evacuate.
- Emergency Lighting: Illuminates escape routes during power failure.
- Flashing Lights: Provide additional visual alerts during emergencies.
- Sprinklers: Water-based fire suppression systems.
- PPE (Personal Protective Equipment): Includes helmets, gloves, and fire-resistant clothing.
- SCBA (Self-Contained Breathing Apparatus): Used by firefighters to provide breathable air in smoke-filled environments.

Emergency Evacuation:

- Escape Routes: Clearly marked pathways leading to safety.
- Emergency Doors: Must be easily accessible and unlocked during emergencies.
- Assembly Points: Safe locations where evacuees gather after leaving the building.
- Evacuation of Differently Abled Individuals: Special procedures to ensure everyone can evacuate safely.

- Evacuation Procedures: Standardized actions to follow during emergencies.
- Fire Drills: Regular practice of evacuation procedures to ensure preparedness in case of a real fire emergency.

2.4.8. Exercise

1. What does the fire triangle consist of?

- Fuel, Heat, Carbon dioxide
- Heat, Oxygen, Fuel
- Fuel, Combustion, Smoke
- Oxygen, Fuel, Smoke detectors

2. The process of combustion requires three essential elements: heat, fuel, and _____.

3. Exothermic reactions release energy in the form of _____ during the reaction.

4. A fire hydrant is an essential firefighting tool that requires adequate _____ to ensure sufficient water pressure.

5. Smoke detectors are used to detect heat from a fire rather than smoke.(T/F)

6. Emergency evacuation procedures do not need to account for the evacuation of differently-abled individuals.(T/F)

7. Flammable liquids can ignite at temperatures above 100°C. (T/F)

2.5. Unit 2.4: Role of Hierarchy in Ensuring Process Safety

2.5.1. Unit Objectives

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

- Understand the role of management in an organization.
- Understand fundamentals of process safety
- Understand the role of occupier, controller of premise
- Understand Contractor Safety Management System
- Understand permit to work system and role of safety committee

2.5.2. 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)

2.5.3. Say

- Describe role of management in an organization.
- Describe fundamental concept of process safety
- Describe the role of occupier, controller of premise
- Describe process of Contractor Safety Management System

- Describe permit to work system and role of safety committee

2.5.4. Explain

- Describe role of management in an organization.
- Describe fundamental concept of process safety
- Describe the role of occupier, controller of premise
- Describe process of Contractor Safety Management System
- Describe permit to work system and role of safety committee

2.5.5. Role-Play Exercise:

Divide the students into small groups and assign each group a scenario related to contractor safety management. Each group will take on one of the following roles:

Safety Manager overseeing contractors.

Contractor working on-site.

Safety Committee member conducting a review meeting.

Occupier ensuring compliance with safety rules.

Scenarios could include:

A contractor requesting a work permit for a high-risk activity (e.g., working at height or with hazardous chemicals).

A contractor not following proper safety procedures, and the safety manager steps in to correct the situation.

A safety committee conducting a regular review meeting to assess contractor compliance and discuss safety concerns.

Instructions:

Role-players must act out the scenario and interact according to their assigned role. Focus on communication, safety checks, and the importance of reporting incidents.

After the role-play, each group will explain their actions to the class and discuss the outcomes of their scenario, such as identifying gaps in contractor safety or reviewing safety permits.

2.5.6. 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.

2.5.7. Summary

1.Role of Management in an Organization:

Management is responsible for establishing and promoting a culture of safety within the organization. They ensure that safety policies are developed, implemented, and adhered to, and that appropriate resources (financial, human, and technical) are allocated to maintain workplace safety. Management also oversees safety training programs, safety audits, and emergency preparedness plans. Their role includes ensuring compliance with legal safety requirements and continuous improvement of safety systems.

2.Fundamental Concept of Process Safety:

Process safety involves the identification, analysis, and management of hazards associated with industrial processes to prevent accidents, injuries, and environmental harm. It focuses on the integrity of process systems and aims to prevent catastrophic incidents such as fires, explosions, and toxic releases. Fundamental concepts include risk assessments, hazard identification, safety barriers, and ensuring the proper design, operation, and maintenance of equipment.

3.Role of Occupier and Controller of Premises:

Occupier: The occupier is the person or entity responsible for the operation of a premises. They are accountable for ensuring safety standards are met and maintained within the workplace. This includes managing safety policies, risk assessments, and compliance with regulatory requirements.

Controller of Premises: The controller of premises is responsible for controlling access to and usage of the workplace. They ensure that the premises are maintained in a safe condition and that safety procedures are followed by employees and contractors alike.

4.Process of Contractor Safety Management System:

Contractor safety management is a system that ensures contractors follow safety standards while working on-site. It involves the selection of contractors based on their safety performance, assessing risks, and ensuring that contractors adhere to workplace safety protocols. This system includes issuing work permits, ensuring contractor training, conducting safety audits, and regular safety meetings. Communication between the contractor, safety managers, and employees is crucial to ensure a safe work environment.

5.Permit to Work System and Role of Safety Committee:

The permit to work system is a formal procedure used to control high-risk activities and ensure that safety measures are followed. It is a written authorization that allows specific tasks to be carried out, outlining safety measures, precautions, and necessary safety checks before the work begins.

The Safety Committee plays a crucial role in overseeing the safety programs within an organization. They ensure the enforcement of safety standards, conduct safety inspections, review accident reports, and promote safety awareness. The committee acts as a communication bridge between management, employees, and contractors, helping to create a safe and compliant working environment.

2.5.8. Exercise

1. **What does QRA stand for in process safety?**
 - a) Quantitative Risk Analysis
 - b) Quality Resource Assessment
 - c) Quick Risk Assessment
 - d) Qualified Risk Analysis
 2. **What is the purpose of a work permit system for contractors?**
 - a) To ensure contractors' work aligns with production goals
 - b) To confirm contractors understand and adhere to safety protocols
 - c) To manage financial transactions with contractors
 - d) To improve efficiency in contractor management
 3. **What is the role of a safety committee in an organization?**
 - a) Organize employee recreational activities
 - b) Monitor and improve workplace safety systems
 - c) Conduct financial audits
 - d) Approve equipment purchases
4. The role of management in an organization includes overseeing operations, ensuring the safety of employees, and maintaining _____ compliance.
5. The safety supervisor is responsible for ensuring that employees are following the organization's safety protocols and _____ safety rules.
6. LOPA (Layer of Protection Analysis) is a risk management technique that evaluates the layers of safeguards needed to prevent a _____ event
7. SIL (Safety Integrity Level) is used to determine how often safety equipment should fail.
- 8 FERA (Fire and Explosion Risk Assessment) focuses on evaluating the likelihood of electrical failures in a workplace.
9. The occupier of a premises is responsible for ensuring all health and safety measures are adhered to on-site.

3. Unit 3 NOS 2: SSD/VSQ/N0133: Hazard Identification & Risk Analysis

3.1. Key Learning Outcomes

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

- Identify hazards, analyse categories of the hazards and perform Hazard and Operability Analysis (HAZOP).
- Fault Tree analysis & Event Tree Analysis, failure modes and effect analysis.
- Perform Hazard Identification and Risk Assessment (HIRA).
- Job Safety Analysis.
- Implement Hierarchy of control in improvement methodologies.
- Understand hidden risk in improved methodologies

3.2. Unit 3.1: Hazard Identification & Control

3.2.1. Unit Objectives

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

- Understand the basic definitions: Hazards, unsafe conditions & acts, incidents & accidents; fatal, non-fatal, near miss incidents & accidents; lost time injury & first aid injury.
- Understand the hierarchy of controls in safety.
- Understanding Importance of each hierarchy of control.
- Understanding the steps in the hierarchy of control.
- Understand different hazard categories & control: Electricity and Fire.
- Understand different hazard categories & control: Tools, equipment, and machinery.
- Understand different hazard categories & control: Health and workplace hazard - Work at height, confined space, working in an excavation, lone working, and slips & trips.
- Understand different hazard categories & control: Movement of workforce, Work related driving and vehicles at workplace.
- Understand different hazard categories & control: Hazardous substances.
- Understand different hazard categories & control: Musculoskeletal disorders, manual handling, and load handling equipment.
- Understand different hazard categories & control: Noise, vibration, radiation, mental ill-health, violence at work, substance abuse at workplace.
- Understand different hazard categories & control: Lifting and Rigging hazards and control.

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 Hazards, unsafe conditions & acts, incidents & accidents; fatal, non-fatal, near miss incidents & accidents; lost time injury & first aid injury
- Describe the hierarchy of controls in safety.
- Describe Importance of each hierarchy of control.
- Describe steps in the hierarchy of control
- Describe the different hazard categories & control

3.2.4. Explain

- Describe Hazards, unsafe conditions & acts, incidents & accidents; fatal, non-fatal, near miss incidents & accidents; lost time injury & first aid injury
- Describe the hierarchy of controls in safety.
- Describe Importance of each hierarchy of control.
- Describe steps in the hierarchy of control
- Describe the different hazard categories & control

3.2.5. Activity.

- **Activity Setup:**
 - Divide the class into small groups (4-5 students per group).
 - Provide each group with a list of workplace hazards categorized into basic types (e.g., Physical, Chemical, Biological, Ergonomic, and Psychosocial hazards).
 - Provide each group with a set of possible control measures (e.g., engineering controls, administrative controls, PPE).
- **Instructions:**
 1. **Hazard Identification:**
 - Each group is given a set of hazards from different categories (e.g., for **Chemical Hazards**, they might have "Exposure to toxic fumes"; for **Physical Hazards**, they might have "Slippery floors").
 - Groups need to identify and categorize the hazards (Physical, Chemical, Biological, Ergonomic, Psychosocial).
 2. **Control Measure Application:**
 - For each hazard identified, groups should discuss and determine the most appropriate control measures. They should consider:
 - **Elimination:** Can the hazard be removed from the workplace entirely?
 - **Substitution:** Can a safer alternative be used?
 - **Engineering Controls:** Can machines or equipment be modified to reduce risk (e.g., ventilation systems, guards)?
 - **Administrative Controls:** Can policies, procedures, or training reduce the risk (e.g., work shifts, safety protocols)?

- **PPE:** Is personal protective equipment required (e.g., gloves, goggles, masks)?
3. **Categorize and Rank:**
- Each group should create a table or chart that lists the hazard, its category, and the recommended control measures. They should also rank the effectiveness of these controls from the highest (Elimination) to the lowest (PPE).
4. **Presentation:**
- Each group presents their findings to the class, explaining:
 - The hazard identified.
 - The hazard category.
 - The control measures they selected and why they chose them.
 - The effectiveness of the controls based on the hierarchy.
 - **Discussion:**
 - Discuss the different types of controls and why certain controls are more effective than others.
 - Emphasize that eliminating the hazard or substituting it with something safer should always be the first choice, followed by engineering and administrative controls, and lastly PPE.
 - **Conclusion:**
 - Recap the importance of identifying hazard categories and applying appropriate control measures.
 - Reinforce that a combination of controls, rather than relying on just one, is often the most effective approach to ensuring safety in the workplace.

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

What is Hazard?

“A circumstance present in an environment that has the potential to cause an UNDESIRABLE event inflicting harm on people or damage to equipment or processes.”

Types of Hazards:

1. Physical Hazards:

Includes machinery, equipment, noise, radiation, temperature extremes, and vibration.

Control: Engineering controls (guards, insulation), administrative controls (work rotation), and PPE (hearing protection, thermal wear).

2. Chemical Hazards:

Includes exposure to toxic chemicals, gases, vapours, dust, and fumes.

Control: Substitution of safer chemicals, proper ventilation, PPE (respirators, gloves), and safe storage practices.

3. Biological Hazards:

Includes bacteria, viruses, fungi, and other pathogens.

Control: Vaccinations, hygiene protocols, PPE (gloves, face masks), and sanitation procedures.

4. Ergonomic Hazards:

Includes repetitive motion, poor workstation design, and manual handling.

Control: Ergonomic assessments, workstation redesign, job rotation, and training on safe lifting techniques.

5. Psychosocial Hazards:

Includes stress, harassment, bullying, and violence.

Control: Employee support programs, clear policies, training, and promoting a positive work culture.

6. Environmental Hazards:

Includes extreme weather, poor air quality, or hazardous materials in the environment.

Control: Site assessments, weather protection, and emergency preparedness plans.

Hierarchy of Controls:

1. **Elimination:** Completely remove the hazard from the workplace.
2. **Substitution:** Replace the hazardous substance or process with a less dangerous one.
3. **Engineering Controls:** Implement physical changes to the workplace, such as ventilation systems or machine guards, to reduce exposure to hazards.
4. **Administrative Controls:** Change the way work is performed, such as rotating shifts or implementing safe work practices, to minimize exposure to hazards.
5. **Personal Protective Equipment (PPE):** Provide workers with protective gear, such as gloves, helmets, and respirators, to reduce the risk of injury.

Key Control Measures:

- Elimination: Remove the hazard entirely.
- Substitution: Replace the hazard with a safer alternative.
- Engineering Controls: Modify equipment or systems to reduce exposure.
- Administrative Controls: Implement work procedures, training, and scheduling.
- PPE: Use protective equipment as a last line of defense.
- Safety auditors should assess hazards in these categories and implement controls to minimize risks in the workplace.

3.2.8. Exercise

1. Lost time injury refers to:

- A) Any injury, regardless of time away from work
- B) An injury that requires medical treatment
- C) An injury that results in missed work days
- D) A minor injury that needs first aid

2. What is a hazard?

- A) An event that causes harm
- B) A condition that has the potential to cause harm

- C) An action taken to mitigate risk
 D) A regulatory requirement
3. What is the primary purpose of the hierarchy of controls?
 A) To increase productivity
 B) To eliminate or reduce hazards
 C) To improve employee morale
 D) To train new employees
4. Why is elimination the most effective control method?
 A) It is the cheapest option.
 B) It completely removes the hazard.
 C) It requires less employee training.
 D) It is easy to implement.
5. What does “lockout/tagout” refer to?
 A) A method to secure tools
 B) A safety procedure for hazardous energy control
 C) A method of training employees
 D) A safety gear
6. What is the purpose of fire extinguishers?
 A) To prevent fires from starting
 B) To control and extinguish small fires
 C) To provide heat
 D) To signal for help
7. True or False: Hazard identification is the first step in developing a safety program to protect workers.
8. True or False: Hazards can be categorized into physical, chemical, ergonomic, biological, and psychosocial types.
9. True or False: The Hierarchy of Control is a system used to minimize or eliminate exposure to hazards in the workplace.
10. True or False: The most effective control measure according to the Hierarchy of Control is to use personal protective equipment (PPE).

3.3. Unit 3.2: Accident Analysis Theories

3.3.1. Unit Objectives

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

- Understand basic definitions- incident, accident, Injury, lost time injury, unsafe condition, unsafe Acts, dangerous occurrences, hazards, error, near miss.
- Understand theories of accident causation- "Heinrich's Domino theory", "Heinrich 300-29-1 model, "Ferrell's Human Factor Model", "Petersen's Accident/Incident Model" and "Reason's Swiss Cheese Model".
- Calculate "Frequency rate & Incident rate", "Lost time case rate", "DART rate" & "Severity rate"

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

- What is an Accident?
- What is Near miss?
- What is an Incident?
- What is Dangerous Occurrence
- What is an Unsafe Act?
- What is Unsafe Condition?
- Describe -"Heinrich's Domino theory
- What do you mean by Lost time case rate

3.3.4. Explain

- Describe Basic definition related to Accident/incident
- Describe theories of accident causation-"Heinrich's Domino theory", "Heinrich 300-29-1 model, "Ferrell's Human Factor Model", "Petersen's Accident/Incident Model" and "Reason's Swiss Cheese Model".
- Describe Frequency rate & Incident rate", "Lost time case rate", "DART rate" & "Severity rate"

3.3.5. Activity

Instructions: Present the following accident causation models on the board or via slides:

Heinrich's Domino Theory

Heinrich's 300-29-1 Model

Ferrell's Human Factor Model

Petersen's Accident/Incident Model

Reason's Swiss Cheese Model

Divide the class into 5 groups, and assign each group one theory/model to discuss. They should:

Understand and summarize the key ideas of their assigned theory.

Identify the role of human error, organizational factors, and other causes of accidents in the model.

Provide a real-life example (or fictional case) that illustrates their assigned model.

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

- **Incident:** An event that could lead to an injury, damage, or loss but may not have resulted in any harm or damage.
 - **Accident:** An unplanned, unexpected event that results in damage, injury, or loss.
 - **Injury:** Harm or damage to a person's body due to an accident or unsafe condition.
 - **Lost Time Injury (LTI):** An injury that results in the employee being unable to work for at least one full workday after the incident.
 - **Unsafe Condition:** A physical condition or environment that poses a risk of injury or damage, such as slippery floors or exposed wires.
 - **Unsafe Acts:** Actions by individuals that create risks, such as improper use of equipment, failure to follow safety procedures, or neglecting safety measures.
 - **Dangerous Occurrences:** Events that have the potential to cause harm, even if no injury or damage occurs (near misses).
 - **Hazards:** Potential sources of harm, such as chemicals, machinery, or environmental factors.
 - **Error:** A mistake or failure to follow proper procedures that can lead to accidents.
 - **Near Miss:** An event that could have caused harm or damage but did not, often due to luck or last-minute intervention.
1. **Heinrich's Domino Theory:** Suggests that accidents are the result of a sequence of events, starting with unsafe acts or conditions that lead to injury, following a chain of events (dominoes).
 2. **Heinrich 300-29-1 Model:** States that for every 300 near misses, there are 29 minor injuries and 1 major injury, emphasizing that accidents are predictable and preventable by addressing underlying issues.
 3. **Ferrell's Human Factor Model:** Focuses on human error as a major cause of accidents and emphasizes the need for better human factors training and ergonomics.
 4. **Petersen's Accident/Incident Model:** Highlights the need for systematic approaches in analysing and preventing accidents, focusing on unsafe behaviours and conditions.
 5. **Reason's Swiss Cheese Model:** Describes how multiple layers of Défense can prevent accidents, but when these defences have holes (flaws), accidents can occur. The holes align in critical situations, leading to failure.
- **Frequency Rate:** A measure of the frequency of injuries or incidents in a given period
 - **Incident Rate:** A metric indicating how frequently incidents occur in relation to the number of hours worked
 - **Lost Time Case Rate:** The number of lost time injuries per 1 million hours worked
 - **DART Rate (Days Away, Restricted, or Transferred Rate):** This rate measures the severity of workplace injuries and illnesses

- **Severity Rate:** Reflects the seriousness of workplace accidents, usually calculated by dividing the total number of lost workdays by the total number of hours worked

3.3.8. Exercise

1. In "Heinrich's Domino theory", the injury is caused by the action of preceding factor. (True/False)
2. The holes in Reason's Swiss Cheese Model represent:
 - A. Technological failures
 - B. Deficiencies or weaknesses in safety barriers
 - C. Both A & B
 - D. None of the above
3. An _____ is an event that causes damage, injury, or loss and is usually unplanned.
4. According to Heinrich's 300-29-1 model, for every 300 near misses, there are approximately:
 - a) 1 fatality
 - b) 29 minor injuries
 - c) 1 injury requiring medical treatment
 - d) 1 incident without injury
5. Heinrich's Domino Theory states that eliminating one cause in the chain can prevent an accident.
6. Reason's Swiss Cheese Model suggests that safety defences are effective only if all layers are intact.
7. Frequency rate and incident rate are calculated using the same formula but focus on different variables (accidents vs incidents). (T/F)
8. The Severity Rate is calculated by multiplying the total number of _____ days by 1,000,000 and dividing it by the total number of hours worked.

3.4. Unit 3.3: Accident Prevention Techniques & Theory of Hierarchical needs

3.4.1. Unit Objectives

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

- Understand "Fault tree analysis" and "Event tree analysis", "HAZOP- Hazard, "Operability analysis" and "Job safety analysis".
- Understand "Hazard Identification and risk assessment".
- Learn the hierarchy of controls, Importance of hierarchy of control & steps in hierarchy of control.
- Understand Maslow's theory of Hierarchical Needs, Herzberg's two-factor theory and McClelland's theory of needs, Vroom's Theory of Expectancy, McGregor's theory X and theory Y and Alderfer's ERG theory

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 “Fault tree analysis” and “Event tree analysis”
- Describe “Job safety analysis”
- Describe “Hazard Identification and risk assessment”.
- Describe hierarchy of controls
- Describe about Maslow’s theory of Hierarchical Needs, Herzberg’s two-factor theory and McClelland’s theory of needs, Vroom’s Theory of Expectancy, McGregor’s theory X and theory Y and Alderfer’s ERG theory

3.4.4. Explain

- Describe “Fault tree analysis” and “Event tree analysis”
- Describe “Job safety analysis”
- Describe “Hazard Identification and risk assessment”.
- Describe hierarchy of controls
- Describe about Maslow’s theory of Hierarchical Needs, Herzberg’s two-factor theory and McClelland’s theory of needs, Vroom’s Theory of Expectancy, McGregor’s theory X and theory Y and Alderfer’s ERG theory

3.4.5. Activity

Fault Tree and Event Tree Analysis

Introduction

Briefly explain Fault Tree Analysis (FTA) and Event Tree Analysis (ETA) concepts. FTA helps identify the root causes of accidents or failures, while ETA traces the outcomes of an event and the sequence of potential outcomes.

Example: In a factory, a fault in a machine could result in various cascading failures. FTA will identify the root cause (e.g., power failure) and its consequences.

ETA will explore different scenarios following the initial failure, determining the probabilities of each outcome.

Group Activity

Divide students into small groups. Provide each group with a real-world safety scenario (e.g., a machine breakdown, fire, or hazardous chemical leak).

Task 1: Have each group perform a Fault Tree Analysis for the scenario, identifying potential causes and analysing how each cause leads to the accident.

Task 2: Then, ask them to perform an Event Tree Analysis by listing possible outcomes based on the initial fault and their probabilities.

Discussion (5 minutes):

Ask each group to present their FTA and ETA findings. Discuss the importance of identifying root causes and potential outcomes in safety management.

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

- **Fault Tree Analysis (FTA):** A deductive, top-down method to identify and analyse the causes of system failures by examining events and conditions that lead to a specific undesirable outcome.
- **Event Tree Analysis (ETA):** An inductive, bottom-up approach used to evaluate possible outcomes from an initiating event, modelling the sequence of events and their probabilities.
- **HAZOP (Hazard and Operability Analysis):** A structured and systematic technique to identify potential hazards and operability issues by reviewing process parameters and deviations.
- **Job Safety Analysis (JSA):** A methodical process for identifying risks associated with specific job tasks, determining control measures, and ensuring workers' safety.
- **Hazard Identification:** Recognizing potential sources of harm or danger in a work environment.
- **Risk Assessment:** Evaluating the likelihood and impact of identified hazards and deciding on appropriate control measures to mitigate the risks.
- **Hierarchy of Controls:** A system used to minimize or eliminate exposure to hazards, ranked from most effective to least:
 - A. Elimination: Removing the hazard completely.
 - B. Substitution: Replacing the hazard with something less dangerous.
 - C. Engineering Controls: Isolating people from the hazard through design or technology.
 - D. Administrative Controls: Changing work practices or procedures to reduce risk.
 - E. Personal Protective Equipment (PPE): Using protective gear as a last line of Défense.
- **Maslow's Hierarchy of Needs: A pyramid of human needs:**
 - A. Physiological (basic needs like food and water)
 - B. Safety
 - C. Social (love, friendship)
 - D. Esteem (self-respect and recognition)
 - E. Self-Actualization (realizing one's potential)
- **Herzberg's Two-Factor Theory:**

Hygiene factors: Factors that prevent dissatisfaction (e.g., salary, working conditions).

Motivators: Factors that lead to satisfaction and motivation (e.g., achievement, recognition).
- **McClelland's Theory of Needs:** Identifies three primary needs that motivate individuals:

Need for Achievement: Desire to accomplish goals.

Need for Affiliation: Desire for relationships and acceptance.

Need for Power: Desire to influence others.
- **Vroom's Theory of Expectancy:** People's motivation is based on the expectation that their effort will lead to desirable outcomes (Expectancy, Instrumentality, Valence).
- **McGregor's Theory X and Theory Y:** Contrasts two views of employee motivation:

Theory X: Assumes employees are inherently lazy and need to be controlled.

Theory Y: Assumes employees are self-motivated and seek responsibility.
- **Alderfer's ERG Theory:** A modification of Maslow's theory with three categories:

Existence needs (basic material requirements)

Relatedness needs (social relationships)

Growth needs (personal development).

These theories provide frameworks for understanding human motivation and behaviour in the workplace and beyond.

3.4.8. Exercise

1. What does HAZOP stand for?
 - a) Hazard Observation Protocol
 - b) Hazard and Operability Analysis
 - c) Hazard Optimization Program
 - d) Hazard Operation Planning
2. Which of the following is an administrative control?
 - a) Installing safety barriers
 - b) Using less hazardous materials
 - c) Conducting safety training programs
 - d) Providing safety helmets
3. Fault Tree Analysis is an inductive method used to analyse the causes of an undesirable outcome in a system. (True/False)
4. Maslow's Hierarchy of Needs includes physiological, safety, social, esteem, and self-actualization needs, with physiological needs being the most basic. (True/False)
5. Herzberg's Two-Factor Theory suggests that hygiene factors, like salary, prevent dissatisfaction, while motivators like achievement lead to satisfaction. (True/False)
6. Maslow's Hierarchy of Needs is a theory that suggests human needs are organized in a _____, starting with physiological needs at the bottom.
7. Substitution is a method in the Hierarchy of Controls where a hazardous material is replaced with a _____ one.

4. Unit 4. SSD/VSQ/N0121: Fire Safety and Emergency Management Plan

4.1. Key Learning Outcomes

- Identify and mitigate the possibility of fire at the workplace.
- Develop plans to tackle different classes of fire.
- Develop plans for evacuations and fire drills.
- Prepare fire-fighting plans for different industry

4.2. Unit 4.1. Understanding of Fire Hazards

4.2.1. Unit Objectives

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

- Understand basic definitions related to fire safety.
- Understand Fire triangle and classification fire.
- Understand science of instigation of fire.
- Understand stages of fire instigation.
- Understand the science of fire spread and mitigation techniques.
- Understand different types of extinguishing media used in fire fighting equipment.

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 Fire triangle and its component
- Describe classification fire
- Describe science of instigation of fire & stages of fire instigation
- Describe science of fire spread and mitigation techniques
- Describe different type of fire fighting equipment

4.2.4. Explain

- Describe Fire triangle and its component
- Describe classification fire
- Describe science of instigation of fire & stages of fire instigation
- Describe science of fire spread and mitigation techniques
- Describe different type of fire fighting equipment

4.2.5. Activity

- Divide the class into small groups and give each group a flashcard with one of the fire classes (A, B, C, D, or K). Each group will:
- Task 1: Identify the types of materials or substances that belong to their assigned fire class.
- Task 2: Discuss how a fire in their class might start (instigation) and how to control it using the fire triangle. After 5 minutes, have each group present their findings.
- Fire Triangle Exercise
- On the whiteboard, draw the Fire Triangle and ask the students to suggest real-world examples of how each element (heat, fuel, and oxygen) can be controlled to prevent fires. For example:
- Remove heat by cooling a fire with water.
- Remove oxygen by using a fire blanket.
- Remove fuel by isolating the combustible material.

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

- Fire Triangle: Composed of three elements: heat, fuel, and oxygen. All must be present for a fire to occur.
- Fire Classification:
- Class A: Solids (e.g., wood, paper)
- Class B: Liquids (e.g., gasoline, oils)
- Class C: Electrical fires
- Class D: Metals
- Class K: Cooking oils and fats
- Science of Fire Instigation: The process by which a fire starts, typically from heat or friction.
- Stages of Fire Instigation:
- Ignition: The point where heat sources trigger combustion.
- Propagation: Fire spreads due to continued fuel and oxygen availability.
- Science of Fire Spread: Fire spreads through three mechanisms:
- Conduction: Heat transfer through materials (e.g., metal surface).
- Convection: Heat carried by air or liquid (e.g., hot air rising).
- Radiation: Heat emitted from flames, spreading outward.
- Mitigation Techniques:
- Remove one of the elements of the fire triangle (heat, oxygen, fuel).

- Use physical barriers or cooling techniques to control fire spread.
- Water: Used for Class A fires (solid combustibles like wood or paper).
- Foam: Used for Class B fires (liquids like oil or gasoline).
- CO2: Effective for Class B and C fires (liquids and electrical fires).
- Dry Chemical Powder: Suitable for Class A, B, and C fires (general-purpose extinguisher).
- Wet Chemical: Specifically, for Class K fires (cooking oils and fats).

4.2.8. Exercise

1. What is the primary goal of a Fire Safety and Emergency Management Plan?

- To comply with local fire codes and regulations
- To minimize property damage in case of a fire
- protect the lives and safety of occupants
- To evacuate the building as quickly as possible

2. The Fire Triangle consists of three elements: heat, fuel, and oxygen. (True/False)

3. Class A fires involve flammable metals such as magnesium or titanium. (True/False)

4. The science of fire instigation studies how the chemical reaction of _____ (fuel) with _____ (oxygen) leads to combustion.

5. The spread of fire is influenced by the type of fuel, wind speed, and the building's layout. (True/False)

6. **Convection** transfers heat by the movement of _____, while **radiation** transfers heat across _____.

7. **Foam** is effective in cooling and smothering fires by creating a barrier between fuel and oxygen. (True/False)

8. **Dry powder** extinguishers are versatile and can be used on both **Class A** and **Class** _____ fires.

4.3. Unit 4.2. Fire-fighting Equipments

4.3.1. Unit Objectives

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

- Understand types of fire-fighting equipment and their principle of operation.
- Perform firefighting equipment planning and placement as per NBC (National Building Code).
- Identify new technological interventions in fire safety.
- Demonstrate use of PPEs in fire safety –SCBA (Self-contained breathing apparatus).

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 types of fire-fighting equipment and their principle of operation
- Describe Explain firefighting equipment planning and placement as per NBC (National Building Code).
- Describe about fire fighter PPE & SCBA

4.3.4. Explain

- Describe types of fire-fighting equipment and their principle of operation
- Describe Explain firefighting equipment planning and placement as per NBC (National Building Code).
- Describe about fire fighter PPE & SCBA

4.3.5. Activity

Introduction

Briefly explain the various types of firefighting equipment and their principles of operation:

Fire Extinguishers: Portable devices used to put out small fires. Types include water, foam, CO₂, dry chemical, and wet chemical.

Fire Hose and Nozzles: Used to deliver water or foam to the fire.

Fire Trucks and Pumps: Larger systems for handling big fires, equipped with hoses and water tanks.

Sprinkler Systems: Automatically activated water distribution systems.

Fire Blankets: Used to smother small fires, especially kitchen fires.

Group Activity

Divide students into small groups and assign each group one type of firefighting equipment.

Task: Research and discuss the operation, applications, and advantages of their assigned equipment.

After 10 minutes, each group presents their findings to the class, explaining how the equipment works and when it should be used.

Discussion

Discuss the principles of operation for each equipment type (e.g., how CO₂ extinguishers work by displacing oxygen and cooling the fire).

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

- **Fire Extinguishers:** Portable devices that use different agents (water, CO₂, foam, dry chemical) to suppress fires.
- **Fire Hose and Nozzles:** Deliver water or foam to control fires.
- **Sprinkler Systems:** Automatic water-based systems to suppress fires in buildings.

- Fire Pumps and Trucks: Larger systems for firefighting, including water delivery and supply.
- Fire Blankets: Used to smother small fires by cutting off oxygen supply.
- Firefighting equipment placement must adhere to National Building Code (NBC) guidelines.
- Fire Extinguishers: Placed at strategic locations, accessible and within a specified range of fire hazards.
- Fire Hose Reels and Hydrants: Positioned to cover all building areas and ensure efficient response.
- Sprinklers: Installed to cover fire-prone areas and activate in case of heat detection.
- Ensure clear emergency exits and proper signage for quick evacuation during emergencies.
- Smart Fire Detection: Connected alarm systems that notify personnel and authorities in real time.
- Drones for Firefighting: Used for firefighting in hard-to-reach areas or hazardous environments.
- AI and IoT-based Systems: Advanced sensors and algorithms that predict fire outbreaks and optimize firefighting efforts.
- Robotic Firefighters: Autonomous robots designed to enter dangerous environments and fight fires.
- Fire-resistant Materials: Modern construction materials that improve fire safety by preventing fire spread.
- Self-Contained Breathing Apparatus (SCBA): Used to protect firefighters from inhaling harmful smoke and gases during firefighting operations.
- Proper use involves checking the SCBA for functionality, ensuring a proper fit, and learning how to operate it in emergency situations.
- Essential for maintaining air quality in hazardous environments and ensuring firefighter safety.

4.3.8. Exercise

1. Which of the following is a type of fire extinguisher designed specifically for electrical fires? a)

Water extinguisher

- b) CO2 extinguisher
- c) Foam extinguisher
- d) Wet chemical extinguisher

2. What is the main principle behind the operation of a foam fire extinguisher?

- a) Cooling the fire with water
- b) Smothering the fire by blocking oxygen
- c) Removing the heat source
- d) Displacing the fuel

3. Water-based fire extinguishers are suitable for Class A (solid) and Class B (liquid) fires.

(True/False)

A CO2 fire extinguisher works by _____ the oxygen around the fire, thus suffocating it.

The placement of fire hose reels in a building is primarily determined by:

- a) The number of rooms
- b) The building's fire load and floor area
- c) The height of the building

d) The colour of the walls

4.The National Building Code (NBC) specifies that fire exits should be wide enough to allow occupants to exit safely in case of an emergency. (True/False)

5.Which of the following technologies allows real-time monitoring of fire hazards in a building?

a) Smoke detectors

b) Thermal imaging cameras

c) Fire alarms

d) Fire drills

6.What is the main purpose of a Self-Contained Breathing Apparatus (SCBA)?

a) To protect the user from heat

b) To provide oxygen to the user in an oxygen-deficient environment

c) To extinguish fires

d) To detect fire hazards

4.4.Unit 4.3. Fire-fighting plan & evacuations

4.4.1. Unit Objectives

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

- Understand and plan emergency evacuation route as per IS1644.
- Understand Fire door, emergency directional signages, assembly point,
- Understand evacuation process for all type of people
- Understand role of “Fire Marshals”.
- Carry out fire drills on emergency evacuation and firefighting equipment.
- Understand Fire Safety Risk assessment and control (HIRAC)

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. Say

- Describe emergency evacuation plan
- Describe Fire door, emergency directional signages, assembly point
- Describe role of “Fire Marshals”.
- Describe Fire Safety Risk assessment and control

4.4.4. Explain

- Describe emergency evacuation plan
- Describe Fire door, emergency directional signages, assembly point

- Describe role of “Fire Marshals”.
- Describe Fire Safety Risk assessment and control

4.4.5. Activity

Planning the Emergency Evacuation Route

Introduction

Briefly explain the importance of emergency evacuation routes and IS1644, which specifies standards for the design of safe evacuation routes during emergencies like fire.

Group Activity

Divide the class into small groups. Provide each group with a floor plan of a building (real or simulated) and markers. Each group is to plan an emergency evacuation route by:

Identifying exits and evacuation routes based on the building layout.

Marking fire exits, assembly points, fire doors, and emergency exits.

Ensuring accessibility for differently-abled individuals by including ramps and wide pathways.

Highlighting emergency directional signages that will guide people in case of evacuation.

Discussion

Each group will present their evacuation plan, explaining their reasoning and how they considered the safety of all individuals, including those with disabilities. Discuss any common challenges and solutions.

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

- Understand and apply the guidelines set out in IS1644 for planning safe evacuation routes.
- Identify and mark emergency exits, fire exits, and escape routes in a building.
- Consider accessibility for differently-abled individuals, ensuring clear and wide pathways.
- Ensure evacuation routes are clearly marked with appropriate signage and unobstructed pathways.
- Plan and designate assembly points for people to gather safely after evacuation.
- Understand Fire Doors, Emergency Directional Signages, Assembly Points, Evacuation, and Role of Fire Marshals
- Understand the importance and function of fire doors in containing fire and smoke.
- Learn how to identify and use emergency directional signages for effective evacuation.
- Recognize the role and location of assembly points for post-evacuation gathering.
- Understand evacuation procedures for all individuals, including those with disabilities.
- Grasp the responsibilities and tasks of Fire Marshals during an evacuation, such as directing people, ensuring safety, and assisting the differently-abled.
- Carry out fire drills to practice emergency evacuation and the use of firefighting equipment.
- Conduct a Fire Safety Risk Assessment (HIRAC) by identifying fire hazards in a given setting.

- Assess the risk levels of identified hazards (high, medium, or low).
- Propose control measures to minimize or eliminate fire risks (e.g., fire extinguishers, alarms, regular maintenance).
- Regularly review and update fire safety measures to ensure ongoing protection.
- Document the findings and improvements made from the risk assessment process.

4.4.8. Exercise

1. When planning emergency evacuation routes, which of the following is NOT a consideration?

- A) Accessibility for differently-abled individuals
- B) Availability of fire extinguishers
- C) Wide, unobstructed paths
- D) Fire exits clearly marked with signage

2. The role of Fire Marshals includes:

- A) Directing the evacuation and assisting in ensuring everyone is accounted for
- B) Making the fire exits smaller
- C) Ignoring the differently-abled individuals during evacuation
- D) Preventing the use of fire doors

3. In a fire safety risk assessment, risks are assessed based on:

- A) The building's colour scheme
- B) The level of fire exposure and severity of the hazard
- C) The number of people in the building
- D) The design of the furniture

4.True/False: Emergency evacuation routes must be clear of obstructions at all times, as per IS1644.

5.True/False: Fire Marshals have the responsibility to guide the evacuation and ensure the safety of individuals during an emergency

6.The evacuation plan must include _____ points where people should gather after evacuating the building

7.Fire doors are used to _____ the spread of fire and smoke to other areas of the building

5. Unit 5 SSD/VSQ/N0122: Hazard Mitigation Methodologies

5.1. Key Learning Outcomes

- Identify hazards at the workplace.
- Implement hierarchy of control in risk assessment.
- Identify residual or hidden risks in implementation of new control measures.
- Perform Risk assessment at workplace.

5.2. Unit 5.1: Understanding Hazard categories

5.2.1. Unit Objectives

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

- Understand the terminologies/definitions in risk assessment.
- Understand hazard categories.
- Understand the hierarchy of controls in safety & Importance of each hierarchy of control.
- Understand different hazards & controls in electricity, use of tools & equipment, machinery, Work at height, confined space, working in an excavation.

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. Say

- Describe terminologies/definitions in risk assessment
- Describe different hazard categories
- Describe hierarchy of controls and its importance

5.2.4. Explain

- Describe terminologies/definitions in risk assessment
- Describe different hazard categories
- Describe hierarchy of controls and its importance

5.2.5. Activity

Give each group a scenario (e.g., working with electrical equipment, using power tools, or working at heights) and ask them to apply the hierarchy of controls.

Have the groups work together to rank the most effective control measures based on the hierarchy (e.g., first, they should consider eliminating the hazard, then substituting it, and so on).

Class Discussion (10 minutes):

Each group will present their chosen hierarchy for their scenario and explain why they ranked the controls in that particular order. Discuss the importance of implementing controls in the right order for maximum safety.

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

1. Risk Assessment Terminology: Students will learn key terms like hazard, risk, likelihood, severity, and control measures. A hazard is anything that has the potential to cause harm, while risk refers to the likelihood of that hazard causing harm and its potential severity.

2. Hazard Categories: Hazards are grouped into categories like:

- Physical Hazards: These include risks from moving machinery, noise, temperature extremes, and radiation.
- Chemical Hazards: These involve exposure to harmful substances, such as toxic chemicals or gases.
- Biological Hazards: These include risks from bacteria, viruses, or other infectious agents.
- Ergonomic Hazards: These arise from repetitive motions, poor workstation design, and manual handling tasks.
- Psychosocial Hazards: These relate to stress, harassment, and other workplace mental health issues.

3. Hierarchy of Control

This unit emphasizes the Hierarchy of Controls, a critical framework used to prioritize safety measures and control hazards in the workplace. The hierarchy is arranged from the most effective to the least effective method of hazard control:

- Elimination: Remove the hazard entirely (e.g., eliminating a dangerous chemical).
- Substitution: Replace the hazard with something less dangerous (e.g., using a less toxic chemical).
- Engineering Controls: Isolate people from the hazard (e.g., using ventilation systems, machine guards).
- Administrative Controls: Implement policies or procedures to minimize exposure (e.g., job rotation, training).
- Personal Protective Equipment (PPE): Use protective gear such as helmets, gloves, or eye protection as a last resort when other controls are not sufficient.

4. Different hazards & controls

- **Electricity Hazards:** Risks from electrical shocks or fires can be mitigated using engineering controls like proper insulation, grounding, and circuit protection devices. PPE such as rubber gloves and mats is also important in preventing electrical accidents.
- **Tools & Equipment Hazards:** Hazards from tools and equipment include sharp edges, moving parts, and incorrect use. These can be controlled through proper maintenance, guarding, and ensuring that workers are trained in safe operating procedures. PPE such as gloves and safety goggles is also recommended.
- **Machinery Hazards:** Machinery presents dangers from moving parts, entanglement, and mechanical failure. Engineering controls like machine guarding, emergency stops, and lockout/tagout procedures help prevent injuries. Regular inspections and maintenance are also critical.
- **Work at Height Hazards:** The risk of falls from height is one of the most common workplace hazards. This can be controlled using fall protection systems (e.g., harnesses, guardrails) and ensuring proper scaffolding. Training in fall prevention and emergency response is also essential.
- **Confined Space Hazards:** Work in confined spaces involves risks such as oxygen deficiency, toxic gas exposure, and physical injury. Control measures include ventilation systems, continuous monitoring of air quality, and the use of personal protective equipment (e.g., respirators).
- **Excavation Hazards:** The primary risk in excavation work is cave-ins. Control measures include shoring or trenching to support excavation walls, as well as the use of PPE and safe work procedures. Additionally, workers should be trained in excavation safety protocols.

5.2.8. Exercise

1. Risk is defined as:

- A) The likelihood of harm occurring from exposure to a hazard
- B) The hazard that causes harm
- C) The severity of the consequences
- D) The elimination of the hazard

2. In the Hierarchy of Controls, which control should be used only when other controls cannot be applied?

- A) Substitution
- B) Elimination
- C) Personal Protective Equipment (PPE)
- D) Engineering controls

3. The primary hazard in excavation work is:

- A) Equipment malfunction
- B) Cave-ins
- C) Chemical exposure
- D) Fall from height

4. When working with **machinery**, _____ is used to prevent workers from coming into contact with moving parts.

5. In excavation work, it is crucial to have proper _____ in place to prevent the risk of cave-ins.

6. True/False: Administrative controls should always be the first step in the hierarchy of controls to address workplace hazards.

7. True/False: The severity of risk is determined by the likelihood of a hazard occurring and the consequences it may cause.

5.3. Unit 5.2: Hazard Control measures

5.3.1. Unit Objectives

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

- Identify hazards related to lone working, slips & trips, hazardous substances, and musculoskeletal disorders.
- Apply control measures to prevent injuries in manual handling and using load handling equipment.
- Implement proper safety protocols and personal protective equipment (PPE).
- Recognize hazards from noise, vibration, radiation, and mental health issues.
- Apply controls to prevent workplace violence, substance abuse, and lifting/rigging hazards.
- Implement effective protective measures, including PPE and administrative controls.
- Use a risk matrix to assess and prioritize hazards based on likelihood and severity.
- Apply the risk matrix to determine the most effective control measures.
- Conduct risk assessments specific to various industries: warehouse, construction, manufacturing, process, and oil & gas.
- Identify hazards and recommend industry-specific control measures to mitigate risks.

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. Say

- Describe hazards related to lone working, slips & trips, hazardous substances, and musculoskeletal disorders and its Control Measures
- Describe hazards from noise, vibration, radiation, and mental health issues and its Control Measures
- Describe risk assessments and risk matrix

5.3.4. Explain

- Describe hazards related to lone working, slips & trips, hazardous substances, and musculoskeletal disorders and its Control Measures
- Describe hazards from noise, vibration, radiation, and mental health issues and its Control Measures
- Describe risk assessments and risk matrix

5.3.5. Activity

Assign each group one of the following case studies based on their hazard category:

Case Study 1: A warehouse environment with hazards such as manual handling, slips and trips, and hazardous substances.

Case Study 2: A construction site with noise, vibration, rigging hazards, and the risk of musculoskeletal disorders.

Case Study 3: A manufacturing plant with concerns about hazardous substances, noise, and musculoskeletal disorders.

Case Study 4: An oil and gas industry setup with risks of slips and trips, noise, vibration, and mental ill-health due to high-stress work.

Hazard Identification & Controls:

In groups, have participants:

- Identify the hazards from the case study
- List the corresponding hazard controls (according to Hierarchy of Controls: Elimination, Substitution, Engineering controls, Administrative controls, PPE).
- Discuss how to manage these hazards using the most appropriate control measures (e.g., if manual handling is involved, discuss the use of equipment like forklifts, lifting aids, and ergonomic workstations).

Risk Matrix Application

- Provide the participants with a Risk Matrix template and ask them to assess the severity and likelihood of each hazard identified. The groups should:
- Determine the risk level for each hazard (Low, Medium, High) using the matrix.
- Prioritize control measures for high-risk hazards (e.g., implementing engineering controls like ventilation for hazardous substances or noise reduction strategies in a noisy environment).

Class Discussion

Conclude with a brief class discussion on how the Risk Matrix helps in prioritizing hazards and implementing the right control measures effectively across different industries.

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

Hazard & Control for Lone Working, Slips & Trips, Hazardous Substances, Musculoskeletal Disorders, Manual Handling, and Load Handling Equipment

- Identify hazards associated with lone working, such as lack of supervision or emergency response.

- Recognize slips and trips hazards (e.g., wet floors, uneven surfaces) and implement appropriate controls (e.g., proper lighting, anti-slip mats).
- Understand the risks from hazardous substances and apply safety measures such as using personal protective equipment (PPE) and ensuring proper storage and handling.
- Identify and mitigate musculoskeletal disorders by promoting ergonomic practices and adjusting workstations.
- Implement control measures for manual handling (e.g., training on lifting techniques, using mechanical aids like trolleys).
- Use load handling equipment (e.g., cranes, forklifts) safely and ensure regular maintenance and operator training.

Hazard & Control for Noise, Vibration, Radiation, Mental Ill-Health, Violence at Work, Substance Abuse, Lifting and Rigging Hazards

- Identify and control noise hazards by using soundproofing, providing hearing protection, and conducting regular noise level assessments.
- Address vibration hazards through vibration-damping equipment, PPE (e.g., anti-vibration gloves), and work-rest schedules.
- Understand radiation hazards and apply safety protocols such as shielding and regular monitoring of radiation levels.
- Recognize risks associated with mental ill-health and implement support systems like stress management programs and regular mental health checks.
- Address violence at work by establishing clear protocols for dealing with aggressive behaviour, providing training, and creating a safe working environment.
- Tackle substance abuse in the workplace by having policies for drug and alcohol testing, providing employee support programs, and conducting awareness training.
- Manage lifting and rigging hazards by ensuring proper training for workers, using certified lifting equipment, and regularly inspecting rigging setups.

Understand & Perform Risk Matrix in Risk Assessment

- Understand how to use a risk matrix to assess risks by evaluating the likelihood and severity of hazards.
- Assign risk levels (e.g., low, medium, high) based on the risk matrix and prioritize controls for high-risk areas.

Perform Risk Assessment in Warehouse, Construction Site, Manufacturing Industry, Process Industry, and Oil & Gas Industry

- Conduct risk assessments specific to different environments:
- Warehouse: Focus on manual handling, machinery, slips and trips, and hazardous materials.
- Construction site: Identify hazards like working at height, machinery, and environmental risks (e.g., weather conditions).
- Manufacturing industry: Address machinery safety, noise, hazardous chemicals, and ergonomic risks.

- Process industry: Focus on chemical hazards, machine safety, fire risks, and handling dangerous substances.
- Oil & Gas industry: Assess specific risks related to fire, explosion, high-pressure systems, and environmental hazards.

5.3.8. Exercise

1. What is the most common control measure for reducing slips and trips hazards in the workplace?
A) Personal Protective Equipment (PPE)
B) Proper lighting and anti-slip mats
C) Mechanical aids for lifting
D) Administrative controls
2. Which of the following is a common control measure for noise hazards in the workplace?
A) Increasing the work pace
B) Using soundproofing materials
C) Allowing workers to take breaks
D) Providing workers with additional lighting
3. In a risk matrix, what does a "high" risk indicate?
A) The hazard is unlikely to occur
B) The hazard has a low severity
C) The hazard requires immediate attention and control measures
D) The hazard is negligible
4. Musculoskeletal disorders are best controlled by adjusting _____ and promoting ergonomic practices
5. Substance abuse can be addressed through workplace policies that include _____ and counselling services.
6. The _____ of a hazard refers to the potential harm it could cause.
7. **True or False:** A risk matrix helps in identifying which hazards require the most urgent control measures
8. **True or False:** Oil and gas industries mainly deal with risks related to fire, explosion, and high-pressure systems.

6. Unit 6 SSD/VSQ/N0123: Hazards and Risk Perception

6.1. Key Learning Outcomes

- Understand perceived risks and effects on individuals.
- Analyse risk tolerance capability of individuals.
- Include risk perception as a dynamic hazard in risk assessment and analysis

6.2. Evaluation of Risk

6.2.1. Unit Objectives

- Evaluate risk based on personal context, tolerance, and acceptance levels.
- Assess the magnitude of risk and understand individual risk behaviour in decision-making.
- Differentiate between real-world modelled risks and perceived risks.
- Analyse and compare actual risks against individual perceptions.
- Understand how personal and collective attitudes shape risk perception.
- Recognize the impact of risk perception on decision-making and safety practices
- Identify and apply various risk communication frameworks.
- Understand how to effectively communicate risks and safety measures within an organization.

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. Say

- Describe risk tolerance, risk magnitude appraisal, risk acceptance and risk behaviour
- Describe perceived risk and modelled risk
- Describe risk perception & attitudes
- Describe risk communication process frameworks

6.2.4. Explain

- Describe risk tolerance, risk magnitude appraisal, risk acceptance and risk behaviour
- Describe perceived risk and modelled risk
- Describe risk perception & attitudes
- Describe risk communication process frameworks

6.2.5. Activity

Divide the participants into small groups and provide each group with a real-life risk scenario (e.g., construction site accident, chemical spill, workplace hazard, etc.).

Example Case Study:

A worker in a factory is exposed to hazardous chemicals daily. The company has safety protocols, but the risk of health problems due to long-term exposure is perceived differently by different workers. Some workers feel confident, while others fear long-term health effects. Additionally, the company conducts annual risk assessments, but these may not reflect the true behaviour and attitudes of the employees towards these risks.

Each group will:

Identify the subjective risk factors involved in the case study (i.e., how workers perceive the risk).

Evaluate the risk using a risk tolerance scale (high, medium, low). They should take into account factors such as the magnitude of the risk and the individual or organizational capacity to accept it.

Use a risk matrix to determine the modelled risk (probability of occurrence vs. severity of impact).

Discuss the risk behaviours exhibited by individuals involved in the scenario and how these influence the overall risk perception.

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

- The capacity to evaluate risks through the lens of personal viewpoints and specific situations.
- Analyse risks by considering factors such as risk tolerance, risk severity, risk acceptance, and individual risk behaviours.
- Recognize the impact of personal or organizational elements on the perception and management of risks.
- Distinguish between perceived risks, which reflect individuals' feelings towards risks, and modeled risks, which involve quantitative evaluations of risks through data and statistical methodologies.
- Evaluate real-world risks by utilizing models that assess the probability and impact of possible threats. Acknowledge the influence of subjective perceptions on the assessment of real-world risks.
- Gain a comprehensive insight into the ways in which various individuals or groups interpret risks and their corresponding attitudes.
- Recognize the impact of emotional and cognitive biases, including fear, overconfidence, and underestimation, on the perception of risk.
- Explore the consequences of differing attitudes toward risks and their influence on decision-making processes.
- Explore various risk communication frameworks, such as ISO 31000, PESTLE, and other systematic approaches for delivering risk-related information.
- Grasp the fundamental concepts of effectively conveying risks to diverse stakeholders, including management, employees, and the general public.

- Determine suitable strategies for clear, transparent, and constructive risk communication to guarantee that the intended message is delivered to the appropriate audience at the optimal time.

6.2.8. Exercise

1. Which of the following factors is most important when performing a subjective evaluation of risk?

- A) Risk models and statistics
- B) Individual's risk tolerance and context
- C) Government regulations
- D) Industry standards

2. Risk acceptance refers to:

- A) The process of eliminating all risks
- B) The willingness to live with certain levels of risk
- C) The calculation of potential losses from a risk
- D) Ignoring the presence of a risk

3. The **risk magnitude appraisal** involves evaluating the _____ and _____ of the potential consequences of a risk.

Which of the following is a key difference between perceived risk and modelled risk?

- A) Perceived risk is based on data and statistics, while modelled risk is based on personal feelings.
- B) Modelled risk uses subjective judgment, while perceived risk uses mathematical models.
- C) Perceived risk is influenced by an individual's emotions, while modelled risk is based on objective data.
- D) Modelled risk considers emotional reactions, while perceived risk uses scientific models.

4. Perceived risk is influenced by _____, such as fear or overconfidence, while modelled risk is based on factual data and statistical analysis.

5. An individual's attitude towards risk is often shaped by:

- A) Only the probability of the risk
- B) Personal experiences, culture, and emotions
- C) The perceived cost of risk management
- D) Workplace safety regulations

6. A key goal of risk communication is to:

- A) Minimize the number of risks in the workplace
- B) Increase public awareness of risks
- C) Prevent accidents from occurring
- D) Ensure stakeholders understand and can make informed decisions about risks

7. An effective risk communication framework involves _____ and _____ of information to ensure it is clearly understood by all stakeholders.

8. True or False: ISO 31000 is an example of a widely accepted risk communication framework.

9. True or False: Risk perception is only influenced by factual data and does not involve emotional or cognitive factors.

6.3. Risk perception management

6.3.1. Unit Objectives

- Understand the concept of risk perception and its influence on decision-making and behaviour.
- Identify factors affecting risk perception, including psychological, social, and cultural influences.
- Recognize the difference between perceived risk and actual risk, and understand how they impact safety practices.
- Develop strategies to manage risk perception to ensure effective risk communication and decision-making.
- Apply techniques to influence and improve risk perception in the workplace to enhance safety culture and reduce risk-taking behaviours.
- Use appropriate communication methods to address misconceptions and increase awareness of actual risks.
- Evaluate the impact of risk perception management on overall risk management outcomes.

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. Say

- Describe risk perception and perceived risk management
- Describe factors affecting risk perception, including psychological, social, and cultural influences
- Describe hazards at workplace due to poor risk perception
- Describe Behaviour based safety and its limitations

6.3.4. Explain

- Describe risk perception and perceived risk management
- Describe factors affecting risk perception, including psychological, social, and cultural influences
- Describe hazards at workplace due to poor risk perception
- Describe Behaviour based safety and its limitations.

6.3.5. Activity

Analysing Risk Perception in the Workplace

Provide each group with a real-world case study scenario based on a workplace risk (e.g., factory, construction site, or office environment).

Case Study:

In a factory, workers consistently ignore safety protocols related to handling heavy machinery. The supervisors observe that workers think they can safely operate the equipment without following the

safety steps, even though there have been near-miss incidents. The workers believe that they are skilled enough to manage the risk, but the actual risk of injury is high.

Each group should:

Identify the risks in the case study based on risk perception (e.g., workers feeling overconfident or underestimating risks).

Analyse how poor risk perception can lead to unsafe behaviours, accidents, and inadequate hazard mitigation methods.

Identify correlations between how risk perception impacts safety strategies, such as why workers might disregard safety protocols.

Propose corrective actions to improve risk perception in the workplace and ensure effective hazard mitigation.

Task: Groups will summarize their findings and propose improvements in risk perception and mitigation strategies, focusing on correcting behaviour and improving safety culture.

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

- Risk perception encompasses the way individuals or groups recognize and assess risks present in their surroundings. This perception is shaped by emotional, psychological, and cognitive influences, rather than relying solely on objective information.
- Managing perceived risk entails comprehending these perceptions and responding to them to promote safer outcomes, even if the actual risk is lower than what individuals believe.
- Risk perception is fundamental in shaping the strategies used to mitigate hazards. An inaccurate understanding of risk can result in either excessive caution or a failure to recognize the true extent of potential threats. Therefore, it is vital to synchronize hazard mitigation approaches with the risk perceptions of individuals or groups to achieve effective and balanced safety protocols.
- Low risk awareness can lead to dangerous actions at work. When workers do not see or properly evaluate risks, they might ignore safety rules or act unsafely. To find these hidden dangers, it is important to know that workers' views on risk can be affected by overconfidence, poor communication, or insufficient knowledge, which can create unsafe environments.
- Behaviour-Based Safety (BBS) focuses on observing and modifying unsafe behaviours to improve safety in the workplace.
- An effective safety culture must combine BBS with improved risk perception to address both behaviour and mindset in managing workplace safety.

6.3.8. Exercise

1. What is the primary factor that influences an individual's risk perception?
 - a) Actual data and facts about the risk
 - b) Emotional, psychological, and cognitive factors
 - c) Statistical analysis of past accidents
 - d) The severity of the hazard
2. How can poor risk perception impact workplace safety?
 - a) It leads to overestimating risks and unnecessary safety precautions.
 - b) It may lead to underestimating risks, resulting in unsafe behaviours.
 - c) It makes workers more vigilant and aware of safety protocols.
 - d) It ensures that risk mitigation measures are always strictly followed.
3. Risk perception is the way an individual or group _____ and evaluates the risks around them.
4. In Behaviour-Based Safety (BBS), the primary focus is on observing and modifying _____ behaviours to improve safety.
5. The main limitation of Behaviour-Based Safety (BBS) is that it does not always address the root cause of unsafe behaviour, which is often linked to _____ perception.
6. True or False: Risk perception is only influenced by objective data and factual risk assessments.
7. True or False: An effective risk perception management strategy includes educating employees about both the actual risks and how their perceptions of those risks may affect their behaviour.

7. Unit 7 NOS 6: SSD/VSQ/N0134: Statutes & Legislative requirements in Health & Safety

7.1. Key Learning Outcomes

- Understand & comply with statutory regulation related to occupation safety, health, and environment of the worksite.
- Protect Worker Health and Safety: The primary goal is to minimize work-related accidents, injuries, and illnesses.
- Enhance Productivity: A safe and healthy workplace leads to increased productivity and reduced absenteeism.
- Comply with Legal Requirements: Adherence to OSH laws and regulations is mandatory to avoid penalties and legal consequences.
- Promote a Positive Work Culture: A strong OSH culture fosters employee morale, job satisfaction, and loyalty.

7.2. Statutes & Legislative requirements

7.2.1. Unit Objectives

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

1. Key Provisions of the BOCW Act, 1996

- **Registration of Establishments:** All establishments engaged in building or other construction work must be registered with the appropriate government.
- **Wages and Benefits:** The Act mandates fair wages and provides for various benefits, including provident fund, gratuity, and insurance.
- **Working Hours:** It regulates working hours, including overtime pay and weekly rest days.
- **Safety, Health, and Welfare Measures:** The Act emphasizes the importance of safety, health, and welfare measures at construction sites, including provisions for first aid, drinking water, sanitation, and protective equipment.
- **Welfare Fund:** A welfare fund is established to provide benefits to construction workers, such as housing, education, and medical facilities.
- **Grievance Redressal:** The Act provides mechanisms for resolving grievances and disputes between employers and workers.

2. Understand & comply with Factories Act, 1948

Clause 6. Approval, Licensing and Registration of Factories

1. Requiring the previous permission in writing of the State Government or The Chief Inspector to be obtained for the site on which factory is to be situated and for the construction or extension of any factory or class or description of factories
2. Requiring for the purpose of considering applications for such permission the submission of plans and specifications:

3. Prescribing the nature of such plans and specifications and by whom they shall be certified

Clause 7A General Duties of the Occupier

4. Every occupier shall ensure, so far as is reasonably practicable, the health, safety and welfare of all workers while they are at works in the factory.
5. Without prejudice to the generality of the provisions of sub-section (1), the matters to which such duty extends, shall include –
 - a) The provision and maintenance of plant and systems of work in the factory that are safe and without risks to health
 - b) The arrangements in the factory for ensuring safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances;
 - c) The provision of such information, instruction, training and supervision as are necessary to ensure the health and safety of all workers at work;
 - d) The maintenance of all places of work in the factory in a condition that is safe without risks to health and the provision and maintenance of such means of access to, and egress from, such places as are safe and without such risks;
 - e) the provision, maintenance or monitoring of such working environment in the factory for the workers that is safe, without risks to health and adequate as regards facilities and arrangements for their welfare at work.

Clause 7B General Duties of Manufacturers

1. Every person who designs, manufactures, imports or supplies any article for use in any factory, shall –
 - a) ensure, so far as is reasonably practicable, that the article is so designed and constructed as to be safe and without risks to the health of the workers when properly used;
 - b) Carry out or arrange for the carrying out of such tests and examination as may be considered necessary for the effective implementation of the provisions of clause (a)
 - c) Take such steps as may be necessary to ensure that adequate information will be available –
 - I. in connection with the use of article in any factory.
 - II. about the use for which it is designed and tested; and about any condition necessary to ensure that the article, when put to such use, will be safe, and without risks to the health of workers.

3.Key Provisions of the OSH Code 2020:

- **Scope of Application:** The Code applies to a wide range of establishments, including factories, mines, plantations, shops, commercial establishments, and more.

- **Health and Safety Standards:** The Code mandates the establishment and maintenance of health and safety standards, including safe working practices, emergency procedures, and regular inspections.
- **Working Hours and Rest Periods:** It specifies maximum working hours, rest periods, and overtime regulations to prevent employee fatigue and promote work-life balance.
- **Welfare Facilities:** Employers are required to provide essential welfare facilities such as drinking water, first-aid, restrooms, and canteens.
- **Occupational Diseases:** The Code addresses occupational diseases and provides for compensation and rehabilitation measures for affected workers.
- **Safety Committees:** The formation of safety committees at the workplace is mandatory to promote safety awareness and incident prevention.
- **Inspection and Enforcement:** The Code empowers inspectors to conduct inspections, issue notices, and impose penalties for non-compliance.

4. <https://www.cheggindia.com/general-knowledge/environment-protection-act-1986/> **Key Provisions of EPA 1986**

- **Environmental Protection:** The Act grants the Central Government authority to take all necessary steps to protect and improve the environment.
- **Pollution Control:** It empowers the government to establish authorities to prevent and control pollution in all its forms.
- **Environmental Standards:** The Act sets standards for various pollutants to ensure safe levels in the environment.
- **Hazardous Substances:** It regulates the handling and disposal of hazardous substances.
- **Public Participation:** It encourages public participation in environmental protection efforts.
- **Penalties:** The Act prescribes penalties for violations of its provisions.

Other Relevant Regulations

Electricity Act 2010 & 2003

- **Purpose:** Consolidates laws related to electricity generation, transmission, distribution, trading, and use.
- **Key Provisions:**
 - Promotes competition in the electricity industry.
 - Protects consumer interests.
 - Ensures electricity supply to all areas.

- Rationalizes electricity tariffs.
- Promotes efficient and environmentally friendly practices.
- Establishes regulatory bodies like the Central Electricity Authority and State Electricity Regulatory Commissions.

National Building Code (NBC) – 2016

- **Purpose:** Provides guidelines for building construction and safety.
- **Key Provisions:**
 - Sets standards for structural design, materials, and construction practices.
 - Includes provisions for fire safety, earthquake resistance, and accessibility.
 - Covers a wide range of building types, including residential, commercial, and industrial.

National Fire Protection Association (NFPA) Regulations

- **Purpose:** Offers detailed standards for fire safety.
- **Key Provisions:**
 - Covers fire prevention, detection, and suppression systems.
 - Provides guidelines for emergency response and evacuation procedures.
 - Includes standards for specific industries and hazards.

Petroleum & Explosive Safety Organization (PESO)-Explosive Act 1884

- **Purpose:** Regulates the handling and storage of explosives.
- **Key Provisions:**
 - Licenses the manufacture, import, export, transport, sale, purchase, and storage of explosives.
 - Sets safety standards for explosives handling and storage facilities.
 - Provides for the investigation of accidents involving explosives.

Gas Cylinders Rule 2016

- **Purpose:** Governs the safety of gas cylinders.
- **Key Provisions:**
 - Sets standards for the design, manufacture, testing, filling, transport, storage, and use of gas cylinders.
 - Requires periodic inspection and testing of gas cylinders.
 - Provides for the safe handling and disposal of gas cylinders.

The Boilers Act 1923

- **Purpose:** Regulates the operation and maintenance of boilers.
- **Key Provisions:**
 - Requires the registration of boilers.
 - Sets standards for the design, construction, installation, and operation of boilers.
 - Provides for the inspection and testing of boilers.
 - Requires the appointment of boiler attendants.

Workmen Compensation Act 1923 & Employee State Insurance Act 1948

- **Purpose:** Provides social security benefits to workers.
- **Key Provisions:**
 - Provides compensation for work-related injuries and diseases.
 - Provides medical benefits, disability benefits, and death benefits.
 - Provides for maternity benefits and unemployment benefits.

Motor vehicle Act 1988

- **Purpose:** Regulates road safety and vehicle operations.
- **Key Provisions:**
 - Sets standards for vehicle design, manufacture, and registration.
 - Provides for the licensing of drivers.
 - Sets speed limits and traffic rules.
 - Provides for the punishment of traffic offenses.

First Aid at workplaces and training on first aid

- **Purpose:** Mandates first aid facilities and training for employees.
- **Key Provisions:**
 - Requires employers to provide first aid facilities at the workplace.
 - Requires employers to train employees in first aid.
 - Provides for the appointment of first aid personnel.

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. Say

- Describe statutory regulation related to occupation safety, health, and environment of the worksite.

7.2.4. Explain

- Describe statutory regulation related to occupation safety, health, and environment of the worksite.

7.2.5. Activity

Statutes and Legislative Requirements in Health and Safety (SSD/VSQ/N0131)

- **Objective:** To understand the key statutes, laws, and legislative requirements related to health and safety, and to practice applying these legal principles in real-world scenarios.
- **Activity Setup:**
 - Divide the class into small groups (4-5 students per group).
 - Provide each group with a list of **statutes and legislative requirements** relevant to health and safety (e.g., the Factories Act, 1948; the Occupational Safety, Health and Working Conditions Code, 2020; the Employees' State Insurance Act, 1948; the Environment Protection Act, 1986; etc.).
 - Prepare a set of **hypothetical workplace scenarios** (e.g., a construction site, a factory, an office, a chemical plant) for each group to analyze.
 - Distribute a **legislation reference sheet** that highlights the key aspects of these laws and regulations, including obligations of employers, rights of workers, and specific safety measures.
- **Instructions:**
 1. **Understanding the Statutes:**
 - Begin by reviewing key statutes and legislative requirements in health and safety, covering the following:
 - **Factories Act, 1948:** Regulations on safety, health, and welfare of workers in factories.
 - **Occupational Safety, Health, and Working Conditions Code, 2020:** Consolidated guidelines on worker safety, working conditions, and occupational health.
 - **Employees' State Insurance Act, 1948:** Provisions for workers' compensation, medical benefits, and insurance in case of accidents.
 - **Environment Protection Act, 1986:** Guidelines for maintaining environmental safety and compliance with pollution control.
 - **Other Relevant Legislation:** National Building Code (NBC), Fire Safety regulations, etc.
 2. **Scenario Analysis:**
 - Each group receives a workplace scenario and is asked to **identify which statutes and regulations apply** to the situation. For example:
 - In a **construction site scenario**, they must identify regulations related to worker safety, use of personal protective equipment (PPE), fall protection, and machinery safety.
 - In a **factory setting**, they must consider issues like machinery safety, worker welfare (e.g., sanitation, lighting), and emergency procedures.
 - In an **office environment**, they should look at ergonomics, fire safety regulations, and workplace safety training.
 - Each group should also identify potential **legal violations** or non-compliance in their assigned scenario.

3. **Research and Application:**

- After identifying relevant laws, groups will **research the specific legislative provisions** that apply to their scenario. They should:
 - Find the sections of the statutes that specifically address the issues in their scenario.
 - Discuss the **legal obligations** of employers and the **rights of workers** within the context of health and safety.
 - Identify **consequences for non-compliance** (e.g., penalties, legal action, fines).

4. **Develop an Action Plan:**

- Based on the identified statutory requirements, each group must develop an **action plan** for the employer in the scenario, outlining:
 - Necessary steps to ensure compliance with the relevant laws.
 - Proposed measures to address safety hazards and health concerns.
 - Ways to communicate safety policies and procedures to workers.
 - Procedures for monitoring and enforcing compliance.

5. **Presentation:**

- Each group presents their analysis and action plan to the class. Their presentation should cover:
 - The statutes they reviewed and how they apply to the scenario.
 - The key health and safety obligations for the employer.
 - Recommended actions to comply with the legal requirements.
 - Potential penalties or consequences of non-compliance.
- After each presentation, allow for questions and feedback from the class.

• **Discussion:**

- Discuss the importance of understanding and adhering to statutory and legislative requirements in maintaining a safe workplace.
- Emphasize the role of health and safety regulations in preventing workplace accidents, protecting workers' rights, and promoting a culture of safety.
- Explore how different industries (construction, manufacturing, healthcare, etc.) have unique legal requirements.

• **Conclusion:**

- Recap the importance of statutory and legislative requirements in health and safety and their role in safeguarding workers and the environment.
- Reinforce that compliance with these laws is not only a legal obligation but also crucial for creating a safe and healthy workplace.
- Encourage students to view health and safety regulations as tools for both compliance and continuous improvement in workplace safety.

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

- BOCW Act, 1996: Apply safety, health, and environmental compliance as per the Building and Other Construction Workers (BOCW) Act.
- Factories Act, 1948: Implement safety, health, and environmental regulations according to the Factories Act.
- OSH Code 2020 & OSHA: Comply with safety, health, and environmental requirements outlined in the Occupational Safety and Health Code and OSHA standards.
- Environment Protection Act, 1986 & ILO Guidelines: Adhere to environmental protection guidelines and ILO standards for EHS compliance.
- Oil Industry Safety Directorate (OSID): Follow safety regulations as per OSID guidelines.
- Mines Vocational Training Rules - DGMS: Ensure compliance with DGMS rules for safety in mining operations.
- Electricity Act, 2010 & 2003: Apply safety and regulatory obligations related to electricity and electrical installations.
- National Building Code (NBC) - 2016: Follow safety guidelines outlined in the National Building Code for construction and building safety.
- National Fire Protection Association (NFPA): Implement fire safety regulations as per NFPA standards.
- PESO - Explosive Act 1884: Ensure compliance with the Explosive Act and PESO regulations for handling explosives.
- Gas Cylinders Rule, 2016: Apply regulatory obligations for the safe use and handling of gas cylinders.
- Boilers Act, 1923: Follow regulations for the safety and operation of boilers.
- Workmen Compensation Act, 1923 & ESI Act, 1948: Adhere to worker compensation and employee state insurance compliance.
- Motor Vehicle Act, 1988: Ensure compliance with road safety regulations under the Motor Vehicle Act.
- First Aid Training: Provide first aid training and ensure its implementation at workplaces.

7.2.8. Exercise

1. What does the BOCW Act of 1996 primarily address?
 - A) Environmental Protection
 - B) Construction Workers' Safety
 - C) Oil Industry Regulations
2. Under the BOCW Act, who is responsible for ensuring safety measures at construction sites?
 - A) Only the workers
 - B) The employer and the contractor
 - C) Government inspectors only

- D) The workers' unions
- D) Factories Safety
3. According to the BOCW Act, which body is responsible for enforcing compliance with safety regulations? (PC1)
- A) Local police
- B) Chief Inspector of the State
- C) Ministry of Labour and Employment
- D) Trade unions
4. What is a consequence of non-compliance with the Factories Act, 1948?
- A) Increased taxes
- B) Legal penalties
- C) Improved working conditions
- D) Employee promotions
5. Under the Factories Act, which of the following is a key responsibility of the factory manager?
- A) To provide entertainment facilities for workers
- B) To ensure compliance with health and safety regulations
- C) To manage financial accounts of the factory
- D) To conduct recruitment drives
6. How often must employers conduct safety training according to OSHA standards?
- A) Only during employee onboarding
- B) Annually or as needed based on workplace changes
- C) Every five years
- D) Training is not mandatory
7. What does the Environment Protection Act, 1986 aim to prevent?
- A) Worker exploitation
- B) Air and water pollution
- C) Traffic accidents
- D) Natural disasters
8. True or False: The Health and Safety at Work Act is a key piece of legislation that outlines the duties of employers and employees regarding workplace safety.
9. True or False: Health and safety legislation only applies to industrial workplaces, not offices or administrative environments.
10. True or False: Employers are legally required to carry out risk assessments to identify and mitigate potential hazards in the workplace.
11. True or False: Employees are not responsible for their own safety or the safety of others under health and safety laws.

8. Unit 8 NOS 7: SSD/VSQ/N0124: Statutes and Legislative requirements in OSHE (International).

8.1. Key Learning Outcomes

- Understand compliance requirements of Occupational Safety and Health Act (USA).
- Understand compliance requirements of Health and Safety work Act 1974(UK).
- Understand compliance requirements of The European Union.
- Understand compliance requirements of The Gulf Countries Acts.
- Understand compliance requirements of ILO convention C155

8.2. Statutes and Legislative requirements (International)

8.2.1. Unit Objectives

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

- Understand the Occupational Safety and Health Act (USA), including the General Duty Clause and Hazard Communication Standard.
- Understand record-keeping requirements and the use of PPE standards as per the Occupational Safety and Health Act (USA).
- Understand a safe and healthy working environment as per the Health and Safety at Work Act 1974 (UK)
- Understand the European Union Framework Directive 89/391/EEC.
- Understand the general principles of workplace health and safety that apply to all workplaces in the EU.
- Understand Federal Law No. 8 of 1980 (UAE) on Regulation of Labour Relations
- Understand Royal Decree No. M/51 of 2003 (Saudi Arabia)
- Understand Qatar Labour Law No. 14 of 2004 (Qatar)
- Understand Labour Law No. 6 of 2010 (Kuwait) and Labour Law No. 36 of 2012 (Kuwait).
- Understand the framework for the implementation of ILO Convention C155

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. Say

- Describe Occupational Safety and Health Act (USA)
- Describe Health and Safety at Work Act 1974 (UK)
- Describe European Union Framework Directive 89/391/EEC
- Describe Federal Law No. 8 of 1980 (UAE) on Regulation of Labour Relations
- Describe Royal Decree No. M/51 of 2003 (Saudi Arabia)
- Describe Qatar Labour Law No. 14 of 2004 (Qatar)
- Describe Labour Law No. 6 of 2010 (Kuwait) and Labour Law No. 36 of 2012 (Kuwait)
- Describe ILO Convention and its implementation

8.2.4. Explain

- Describe Occupational Safety and Health Act (USA)
- Describe Health and Safety at Work Act 1974 (UK)
- Describe European Union Framework Directive 89/391/EEC
- Describe Federal Law No. 8 of 1980 (UAE) on Regulation of Labour Relations
- Describe Royal Decree No. M/51 of 2003 (Saudi Arabia)
- Describe Qatar Labour Law No. 14 of 2004 (Qatar)
- Describe Labour Law No. 6 of 2010 (Kuwait) and Labour Law No. 36 of 2012 (Kuwait)
- Describe ILO Convention and its implementation

8.2.5. Activity

Divide the class into small groups.

Each group is assigned a case study

In a manufacturing plant, workers were exposed to hazardous chemicals without proper protective equipment. Following an OSHA inspection, it was found that the employer had violated several safety standards, including failure to provide necessary personal protective equipment (PPE) and inadequate training on chemical hazards. As a result, the employer was fined heavily, and corrective actions were mandated, including better training for employees and the provision of appropriate PPE.

Groups will discuss the following questions:

What was the main hazard that led to the incident?

Which aspects of the OSHA General Duty Clause or Hazard Communication Standard were violated?

What PPE was required, and how did lack of PPE contribute to the incident?

How could the risk have been mitigated by implementing a safe system of work according to the Health and Safety at Work Act (UK)?

Each group will present their findings and recommend preventive measures.

Learning Outcome:

Learners will understand the application of OSHA's General Duty Clause, hazard communication standards, and the Health and Safety at Work Act (UK) in real-world scenarios.

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

1. Occupational Safety and Health Act (USA):

- The General Duty Clause requires employers to provide a workplace free from recognized hazards that could cause harm. The Hazard Communication Standard (HCS) ensures that employees are informed about the hazards of chemicals they may be exposed to at work, including labelling, training, and safety data sheets.
- Employers must maintain accurate records of workplace injuries and illnesses. They are also required to provide personal protective equipment (PPE) according to OSHA standards to protect workers from hazards.
- OSHA emphasizes maintaining a safe and healthy environment, which includes safe equipment and machinery, safe work systems, and adequate welfare facilities.

2. Health and Safety at Work Act 1974 (UK):

This Act ensures that employers are responsible for the health, safety, and welfare of their employees. It mandates the provision of safe equipment, machinery, and systems of work, as well as ensuring that employees have access to adequate welfare facilities.

3. European Union OSHE Acts:

The EU Framework Directive sets minimum safety and health requirements for workplaces across all EU member states. It includes the obligation to assess and minimize workplace risks, provide training, and ensure employee participation in health and safety matters. This involves implementing preventive measures and controlling risks to ensure a safe and healthy work environment in all workplaces within the EU.

4. Gulf Countries OSHE Acts:

- Regulates labour relations in the UAE, ensuring workers' health, safety, and rights are protected in the workplace.
- Focuses on workplace safety, requiring employers to follow specific regulations to protect workers from hazards.
- Qatar Labour Law No. 14 of 2004
- Ensures safe working conditions and provides guidelines for health and safety at workplaces in Qatar.
- Kuwait Labour Law No. 6 of 2010 & Labour Law No. 36 of 2012
- Provides comprehensive guidelines for worker protection, ensuring safe working conditions, equipment, and systems of work in Kuwait.

5. ILO Convention C155 (International Labour Organization):

ILO Convention C155 establishes the framework for occupational safety and health systems in countries that ratify it. It aims to promote safe work environments, focusing on prevention, risk assessment, and workers' rights to participate in health and safety matters.

8.2.8. Exercise

1. Which of the following is a key requirement under OSHA's General Duty Clause?
 - a) Employers must provide PPE for all workers
 - b) Employers must ensure a workplace free from recognized hazards
 - c) Employers must maintain worker health records
 - d) Employers must pay for medical expenses for all injuries
2. The Hazard Communication Standard (HCS) in OSHA mandates:
 - a) Employers must provide detailed reports of workplace injuries
 - b) Employers must provide training on the use of hazardous chemicals
 - c) Employers must implement a health insurance policy
 - d) Employers must offer stress management workshops
3. The ILO Convention C155 primarily focuses on:
 - a) Workers' right to join trade unions
 - b) Occupational safety and health systems and prevention
 - c) Establishing minimum wages for workers
 - d) The protection of workers in hazardous industries
4. True/False: Under the Occupational Safety and Health Act (USA), employers are required to ensure a workplace is free from recognized hazards that can cause serious injury or death.
5. True/False: The European Union's Framework Directive 89/391/EEC requires that all employers provide workers with annual health insurance policies.
6. The ILO Convention C155 aims to establish a framework for _____ systems to prevent workplace accidents and illnesses.
7. The EU Framework Directive 89/391/EEC sets minimum health and safety requirements that apply to all _____ in the EU.

9. Unit 9. NOS 8: SSD/VSQ/N0125: Safety Auditing and Inspection

9.1. Key Learning Outcomes

- Understand Audit & Inspections process globally.
- Prepare audit and review documents.
- Provide continual improvement in health and safety.

9.2. Safety Audit codes & requirements

9.2.1. Unit Objectives

- Understand safety audit requirements as per IS14489.
- Understand roles & responsibilities of parties involved in safety audit.
- Understand how to prepare safety audit checklist as per IS14489.
- Understand safety audit requirements as per ISO 45001.
- Understand how to formulate safety audit checklist as per ISO 45001

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 safety audit requirements as per IS14489
- Describe roles & responsibilities of parties involved in safety audit.
- Describe about how to prepare safety audit checklist as per IS14489
- Describe safety audit requirements as per ISO 45001
- Describe about how to formulate safety audit checklist as per ISO 45001

9.2.4. Explain

- Describe safety audit requirements as per IS14489
- Describe roles & responsibilities of parties involved in safety audit.
- Describe about how to prepare safety audit checklist as per IS14489
- Describe safety audit requirements as per ISO 45001
- Describe about how to formulate safety audit checklist as per ISO 45001

9.2.5. Activity

Divide participants into small groups of 4-5 members.

Provide each group with a list of stakeholders involved in a safety audit (e.g., safety officers, management, employees, external auditors, etc.).

Ask them to brainstorm and write down the roles and responsibilities of each stakeholder in the safety audit process.

Presentation & Discussion:

Have each group present their findings to the class.

Facilitate a discussion about the key roles (e.g., ensuring compliance, data collection, conducting interviews, preparing audit reports, etc.) and how effective collaboration contributes to a successful safety audit.

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

1. Understand safety audit requirements as per IS14489

IS14489 provides a framework for conducting safety audits in organizations to evaluate compliance with safety standards and improve safety performance. Emphasizes evaluating safety policies, hazard identification, risk assessments, safety controls, emergency protocols, and workplace conditions.

2. Understand roles & responsibilities of parties involved in safety audit

- Auditor: Conducts the audit, identifies hazards, and assesses compliance with safety standards.
- Management: Provides resources, ensures corrective actions are taken, and supports the audit process.
- Employees: Provide input on safety practices and report hazards.
- Safety Officer: Ensures compliance with safety regulations and oversees the implementation of audit recommendations.

3. Formulate safety audit checklist as per IS14489

Checklist includes evaluating:

- Organizational safety policies
- Risk management practices
- Training and awareness programs
- Compliance with legal and regulatory requirements
- Emergency response and preparedness
- Hazard controls and PPE usage

4. Understand safety audit requirements as per ISO 45001

ISO 45001 sets out the requirements for occupational health and safety (OHS) management systems.

Focuses on:

- Identifying and assessing hazards and risks in the workplace
- Employee involvement and consultation

- Continual improvement of OHS management systems
- Compliance with legal and regulatory standards

5. Formulate safety audit checklist as per ISO 45001

Checklist includes evaluating:

- Hazard identification and risk assessment processes
- Employee participation in OHS management
- Emergency preparedness and response
- Legal compliance and industry standards
- Documentation of safety records and performance indicators
- Continuous monitoring and improvement of safety systems

9.2.8. Exercise

What is the main purpose of a safety audit as per IS 14489?

- To evaluate the profitability of a company
- To assess the effectiveness of safety practices and compliance with safety standards
- To identify marketing opportunities
- To review financial records

Which standard provides requirements for occupational health and safety management systems, focusing on hazard identification and employee involvement?

- IS 14489
- ISO 45001
- OSHA 1910
- ISO 9001

The primary objective of a safety audit according to IS 14489 is to evaluate _____ and ensure compliance with safety regulations.

As per ISO 45001, _____ involves identifying, assessing, and controlling workplace hazards to improve health and safety performance.

IS 14489 primarily focuses on evaluating marketing strategies in organizations.

ISO 45001 requires employees to be actively involved in identifying hazards and assessing risks in the workplace.

The safety audit checklist according to IS 14489 does not include compliance with legal regulations and emergency preparedness procedures.

9.3. Safety Audit & Inspections

9.3.1. Unit Objectives

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

- Understand how to prepare audit checklists tailored to the specific safety requirements of industries such as construction, mining, oil & gas, manufacturing, and chemical sectors.
- Understand how to conduct thorough inspections of scaffolding to ensure compliance with safety regulations and standards.

- Perform detailed inspections of Personal Protective Equipment (PPE) to ensure proper use, maintenance, and compliance with safety protocols.
- Understand how to conduct electrical safety inspections to identify potential hazards and ensure the integrity of electrical systems and equipment.

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. Say

- Describe how to prepare audit checklists tailored to the specific safety requirements
- Describe process of conduct thorough inspections of scaffolding
- Describe detailed inspections process of Personal Protective Equipment (PPE)
- Describe electrical safety inspections

9.3.4. Explain

- Describe how to prepare audit checklists tailored to the specific safety requirements
- Describe process of conduct thorough inspections of scaffolding
- Describe detailed inspections process of Personal Protective Equipment (PPE)
- Describe electrical safety inspections

9.3.5. Activity

Industry-Specific Audit Checklist Creation

Objective: Participants will create an audit checklist for different industries (construction, mining, oil & gas, manufacturing, and chemical).

Instructions:

Divide the class into five groups, assigning each group one industry (construction, mining, oil & gas, manufacturing, or chemical).

Ask each group to identify key safety hazards and regulatory requirements for their assigned industry.

Each group will create a detailed safety audit checklist, including categories like:

Personal protective equipment (PPE)

Scaffolding safety

Machinery safety

Environmental concerns

Hazardous materials handling

groups will present their checklists to the class and discuss their findings.

Expected Outcome: Participants will learn how to tailor audit checklists to specific industries, identifying relevant safety hazards and required precautions.

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

The Safety Audit & Inspections unit ensures that individuals are equipped with the skills and knowledge required to assess safety practices in various industries such as construction, mining, oil & gas, manufacturing, and chemical sectors.

- **Preparing Audit Checklists** : The individual must be able to develop comprehensive audit checklists tailored to the specific safety risks and regulatory requirements of different industries. This helps in identifying hazards and ensuring compliance during safety audits.
- **Scaffolding Inspections** : The individual should be able to inspect scaffolding structures for safety, identifying any hazards such as structural instability or non-compliance with safety regulations, and ensuring proper maintenance.
- **Inspection of PPEs** : Competence in inspecting Personal Protective Equipment (PPE) is essential. The individual must be able to check the condition and suitability of various PPE items, ensuring they are functional and comply with safety standards.
- **Electrical Safety Inspections** :The individual will also be required to inspect electrical protective devices like Miniature Circuit Breakers (MCBs), Residual Current Circuit Breakers (RCCBs), and Earth Leakage Circuit Breakers (ELCBs) for proper operation, ensuring electrical safety and preventing hazards.
- **Audit Report Preparation:** (After completing the inspections, individuals must be capable of preparing a detailed audit report, documenting findings, observations, corrective actions, and recommendations to address any identified safety issues.

9.3.8. Exercise

1. Which of the following is NOT a key component of a safety audit checklist?

- A) Hazard identification
- B) Equipment inspection
- C) Employee salary details
- D) Safety procedures verification

2. What is the role of an MCB (Miniature Circuit Breaker) in electrical safety inspections?

- A) To regulate the temperature of the electrical system
- B) To prevent overload or short circuit by automatically switching off
- C) To control the electrical appliances in the area
- D) To ensure the electrical meter is working correctly

3. The purpose of preparing an audit checklist for different industries is to ensure _____ compliance and safety standards are met during inspections.

4. Scaffolding inspections primarily focus on checking the _____ and safety of the structure.
5. True or False: An audit checklist for the chemical industry should include items related to hazardous materials, chemical spills, and emergency response plans.
6. True or False: Scaffolding inspections should focus on aesthetic concerns, such as paint quality and appearance.

10. Unit 10 NOS 9:SSD/VSQ/N0112: Pollution & Environment Management, Global warming, and sustainability

10.1. Key Learning Outcomes

- Identify & Understand the impact of pollution.
- Understand how to perform Environmental Impact Assessment.
- Understand waste management techniques

10.2. Pollution & Environment Management

10.2.1. Unit Objectives

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

- Understand type of environment & atmospheric pollution ,its ill effects and control.
- Understand types of waste, its disposal techniques, and concepts of effluent treatment plants.
- Understand hazardous waste management & 6R's (Rethink, Refuse, Reduce, Reuse, Recycle, Repair).
- Understand the regulatory requirements of Central Pollution Control Board & State Pollution Control Board and Environment Protection Act, 1986” & KYOTO protocol.

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 type of environment & atmospheric pollution ,its ill effects and control
- Describe types of waste, its disposal techniques, and concepts of effluent treatment plants.
- Describe about hazardous waste management & 6R's (Rethink, Refuse, Reduce, Reuse, Recycle, Repair
- Describe regulatory requirements of Central Pollution Control Board & State Pollution Control Board and Environment Protection Act, 1986” & KYOTO protocol

10.2.4. Explain

- Describe type of environment & atmospheric pollution ,its ill effects and control
- Describe types of waste, its disposal techniques, and concepts of effluent treatment plants.
- Describe about hazardous waste management & 6R's (Rethink, Refuse, Reduce, Reuse, Recycle, Repair
- Describe regulatory requirements of Central Pollution Control Board & State Pollution Control Board and Environment Protection Act, 1986” & KYOTO protocol

10.2.5. Activity

Divide the class into four groups. Assign each group a type of pollution (air pollution, water pollution, land pollution, and noise pollution).

Research and Presentation:

Each group will research their assigned pollution type, focusing on:

Sources of pollution

Ill effects on human health and the environment

Control measures and technologies to reduce or eliminate pollution

Each group will create a presentation using visual aids (e.g., slides, charts, or posters) and share their findings with the class.

Discussion:

After all presentations, the class will discuss common themes, such as the interconnection between different types of pollution and how they affect various ecosystems and public health.

Expected Outcome: Participants will be able to identify various pollution types, their environmental and health impacts, and the importance of effective control measures.

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

The **Pollution & Environment Management** unit focuses on equipping individuals with the essential knowledge and skills to manage and mitigate various types of pollution and waste, while ensuring compliance with environmental regulations.

1. **Types of Pollution** : Individuals will gain a thorough understanding of different pollution types such as atmospheric pollution, water pollution, land pollution, and noise pollution. They will learn about their causes, ill effects on health and the environment, and how to control and reduce these pollutants to safeguard public well-being and the ecosystem.
2. **Waste Management and Effluent Treatment** : The unit covers various types of waste, including municipal and industrial waste, and the methods for their disposal. This includes understanding the principles and operation of effluent treatment plants (ETPs), which are essential for treating and managing waste water in industrial operations.
3. **Hazardous Waste Management and the 6R's** :Competence is developed in hazardous waste management, focusing on the **6R's**: Rethink, Refuse, Reduce, Reuse, Recycle, and Repair. These principles guide individuals in minimizing waste generation, promoting sustainability, and reducing environmental harm.

4. **Regulatory Framework** :Participants will also be familiarized with the regulatory frameworks governing environmental protection, including the **Central Pollution Control Board (CPCB)**, **State Pollution Control Board (SPCB)**, and the **Environment Protection Act of 1986**. Additionally, they will understand the significance of international agreements like the **Kyoto Protocol** in addressing global environmental challenges, particularly climate change.

10.2.8. Exercise

1. What is the main focus of an effluent treatment plant (ETP)?
 - A) Solid waste recycling
 - B) Purification of air
 - C) Treating wastewater before disposal
 - D) Managing hazardous chemicals
2. _____ pollution is caused by excessive emissions from vehicles, factories, and industrial activities that degrade air quality.
3. The process of _____ involves treating wastewater to remove contaminants before it is released into the environment.
4. True or False: Noise pollution primarily results from industrial activities and loud machinery, and can lead to hearing loss and stress.
5. True or False: The primary goal of the Environment Protection Act of 1986 is to promote industrial growth without considering environmental impacts.
6. True or False: The Central Pollution Control Board (CPCB) and State Pollution Control Boards (SPCB) are responsible for implementing and enforcing environmental regulations in India.

10.3. Environment Monitoring Technique

10.3.1. Unit Objectives

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

- Understand remote sensing, air monitoring, biological monitoring, soil monitoring and water monitoring
- Understand EIA- Environmental impact assessment.
- Understand LCI- Life cycle Impact assessment

10.3.2. 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)

10.3.3. Say

- Describe remote sensing, air monitoring, biological monitoring, soil monitoring and water monitoring process
- Describe about EIA- Environmental impact assessment
- Describe about LCI- Life cycle Impact assessment

10.3.4. Explain

- Describe remote sensing, air monitoring, biological monitoring, soil monitoring and water monitoring process
- Describe about EIA- Environmental impact assessment
- Describe about LCI- Life cycle Impact assessment

10.3.5. Activity

Group Activity: Divide the class into five groups. Each group will be assigned one of the following topics:

Group 1: Remote Sensing

Group 2: Air Quality Monitoring

Group 3: Biological Monitoring

Group 4: Soil Monitoring

Group 5: Water Monitoring

Research & Presentation:

Each group should research their assigned topic and cover the following aspects:

What is the monitoring technique?

How is the monitoring conducted?

What equipment or technology is used?

What are the key parameters measured?

Why is the technique important for environmental management?

Each group should create a presentation (using PowerPoint or posters) to explain their findings.

Classroom Presentation:

After the research is complete, each group will present their findings to the class. They should include real-world examples where these techniques have been used (e.g., using satellite imagery for remote sensing or using air quality sensors for monitoring pollution levels).

Class Discussion:

After each presentation, the instructor will facilitate a discussion about the similarities and differences between the monitoring techniques. Emphasize the importance of using a combination of methods to get a holistic understanding of environmental health.

Expected Outcome: Students will gain a comprehensive understanding of various environmental monitoring techniques and their role in tracking pollution and ecosystem health.

10.3.6. 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

10.3.7. Summary

1. **Environmental Monitoring Techniques** : Environment Monitoring Techniques unit equips individuals with the necessary skills and knowledge to monitor and assess environmental health and impacts using various tools and methodologies
 - Remote Sensing: Utilizes satellite or aerial imagery to monitor large-scale environmental changes, such as deforestation, pollution, and land use patterns.
 - Air Monitoring: Involves measuring pollutants in the air, such as particulate matter (PM), nitrogen oxides (NOx), and carbon dioxide (CO₂), to assess air quality and its impact on human health.
 - Biological Monitoring: Uses biological indicators (e.g., plant or animal species) to assess the health of ecosystems and detect environmental stressors.
 - Soil Monitoring: Involves testing soil for nutrients, pH levels, contaminants, and other factors that affect soil health and agricultural productivity.
 - Water Monitoring: Focuses on the analysis of water quality parameters such as pH, turbidity, dissolved oxygen, and contaminants to ensure safe water for consumption and the health of aquatic ecosystems.
2. Environmental and Life Cycle Impact Assessments: The unit also covers important frameworks used to assess environmental impacts at different stages:
 - Environmental Impact Assessment (EIA): A process used to evaluate the potential environmental effects of a proposed project or development. EIA helps in identifying potential negative impacts and suggesting mitigation measures before implementation.
 - Life Cycle Impact Assessment (LCIA): Analyses the environmental impact of a product or service across its entire life cycle, from raw material extraction to disposal. LCIA helps in understanding the cumulative environmental effects and promotes sustainable practices by identifying opportunities to reduce negative impacts.

10.3.8. Exercise

1. Which of the following techniques is used to monitor large-scale environmental changes using satellite or aerial imagery?
 - A) Soil Monitoring
 - B) Air Quality Monitoring
 - C) Remote Sensing
 - D) Biological Monitoring
2. What parameter is commonly measured in air quality monitoring to assess pollution levels?
 - A) Soil pH
 - B) Particulate Matter (PM)
 - C) Water Temperature

D) Biological Diversity

3. Which monitoring technique uses biological indicators, such as plants or animals, to assess ecosystem health?

A) Soil Monitoring

B) Biological Monitoring

C) Water Monitoring

D) Air Monitoring

4. In air quality monitoring, pollutants like _____ are measured to assess the levels of pollution in the atmosphere.

5. _____ monitoring involves the use of biological indicators, such as plants or animals, to assess the health of ecosystems.

6. An _____ is a process used to assess the potential environmental impacts of a proposed project or development.

7. True or False: Soil monitoring is used exclusively to measure the concentration of greenhouse gases in the atmosphere.

8. True or False: Life Cycle Impact Assessment (LCIA) only assesses environmental impacts during the production stage of a product's life cycle.

10.4. Global warming

10.4.1. Unit Objectives

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

- Understand global warming and climate change, greenhouse gasses & greenhouse effect, carbon cycle, carbon footprints, carbon neutrality & Carbon credits.
- Understand ozone layer, ozone layer depletion, elements affecting ozone layer, acid rain, wet deposition, dry deposition, and its factors.
- Understand the meaning of Eco-friendly, energy conservation methods using solar, hydro, wind, biomass, water and harvesting.

10.4.2. 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)

10.4.3. Say

- Describe about global warming and climate change, greenhouse gasses & greenhouse effect, carbon cycle, carbon footprints, carbon neutrality & Carbon credits
- Describe about ozone layer, ozone layer depletion, elements affecting ozone layer, acid rain, wet deposition, dry deposition, and its factors.

- Describe about Eco-friendly, energy conservation methods using solar, hydro, wind, biomass, water and harvesting.

10.4.4. Explain

- Describe about global warming and climate change, greenhouse gasses & greenhouse effect, carbon cycle, carbon footprints, carbon neutrality & Carbon credits
- Describe about ozone layer, ozone layer depletion, elements affecting ozone layer, acid rain, wet deposition, dry deposition, and its factors.
- Describe about Eco-friendly, energy conservation methods using solar, hydro, wind, biomass, water and harvesting.

10.4.5. Activity

Divide the class into small groups. Assign each group one of the following topics:

- Carbon Cycle
- Carbon Footprint
- Carbon Neutrality
- Carbon Credits

Each group will research their assigned topic and create a brief presentation (using posters, PowerPoint, etc.) that explains the concept, its relevance to climate change, and real-world examples or solutions.

Group Presentations:

After research, each group will present their findings to the class. Encourage the class to ask questions and discuss how they can reduce their own carbon footprint.

Class Discussion:

After the presentations, the teacher will facilitate a discussion on ways to achieve carbon neutrality in daily life (e.g., reducing energy consumption, using renewable energy sources, offsetting emissions).

Expected Outcome: Students will understand how human activities contribute to global warming and climate change, the concept of carbon footprints, and ways to mitigate climate change through carbon neutrality and carbon credits.

10.4.6. 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

10.4.7. Summary

1. Global Warming and Climate Change

This section explains the science behind global warming and climate change, focusing on the role of greenhouse gases like carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) in trapping heat in the atmosphere. The greenhouse effect is a natural process, but human activities, particularly the burning of fossil fuels, have intensified it, leading to global warming. The carbon cycle explains how

carbon is exchanged between the atmosphere, oceans, soil, and living organisms. The carbon footprint measures the total amount of greenhouse gases emitted by human activities, while carbon neutrality refers to balancing emitted carbon with equivalent offset actions. Carbon credits offer a mechanism to reduce emissions by allowing organizations to offset their carbon footprint by investing in carbon-reducing projects.

2. Ozone Layer and Its Depletion

The ozone layer, located in the Earth's stratosphere, absorbs harmful ultraviolet (UV) radiation from the sun, protecting life on Earth. However, human-made chemicals such as chlorofluorocarbons (CFCs) have caused ozone layer depletion, leading to increased UV radiation reaching the Earth's surface. This depletion contributes to health risks like skin cancer and eye damage, as well as environmental impacts like weakened ecosystems. The acid rain phenomenon, resulting from the reaction of pollutants with water vapor in the atmosphere, causes wet and dry deposition. Wet deposition involves pollutants being washed out by rain, while dry deposition occurs when particles settle on the Earth's surface.

3. Eco-friendly Practices and Energy Conservation

The concept of being eco-friendly emphasizes sustainable practices that minimize environmental impact. Energy conservation methods play a key role in this approach, focusing on the use of renewable energy sources such as solar, wind, hydropower, and biomass. These energy sources reduce dependency on fossil fuels, decrease greenhouse gas emissions, and contribute to a cleaner environment. Additionally, practices like water harvesting help conserve water, promoting sustainable management of this vital resource. Adopting eco-friendly practices and renewable energy methods is essential for reducing the overall environmental footprint and mitigating climate change.

10.4.8. Exercise

- What is the primary cause of global warming?
 - Natural climate cycles
 - Human activities such as burning fossil fuels
 - Volcanic eruptions
 - Ocean currents
- Which greenhouse gas is most associated with climate change due to human activities?
 - Oxygen
 - Nitrous oxide
 - Carbon dioxide
 - Methane
- What does the carbon footprint measure?
 - The total mass of carbon in the Earth's crust
 - The total amount of greenhouse gases emitted by human activities
 - The number of trees planted to reduce emissions
 - The size of forests in carbon sequestration
- The _____ cycle describes how carbon is exchanged between the Earth's atmosphere, oceans, soil, and living organisms.

5. The process by which the ozone layer is depleted due to chemicals like CFCs is called _____.
_____ is a phenomenon caused by pollutants like sulphur dioxide and nitrogen oxides reacting with water in the atmosphere to form acidic compounds.
6. True or False: The ozone layer is essential for protecting life on Earth from harmful ultraviolet radiation.
7. True or False: CFCs (chlorofluorocarbons) contribute to ozone layer depletion.
8. True or False: The use of wind and solar energy is considered harmful to the environment.
9. True or False: Acid rain is a result of air pollutants like sulphur dioxide and nitrogen oxides reacting with water in the atmosphere.

11. Unit 11 NOS 10: SSD/VSQ/N0104: Plan, Organize and Emergency protocols

11.1. Key Learning Outcomes

- Planning of resources for own work and communication to concerned subordinates, co-workers, and superiors.
- Provide necessary support to subordinates, coordinate with co-workers and liaise with superiors and other teams.
- Monitor progress of work and adjust, manage, or project requirements on time.
 - Setting up emergency protocols and implementing them at working places to minimize the loss in
 - case of any incident or accident.

11.2. Unit 7.1: Planning of Work

11.2.1. Unit Objectives

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

- Understand process of plan the resources, schedules, and timelines as per work timelines given by superiors.
- Understand hierarchy of the organization and communicate to concerned co workers and superiors.
- Understand how to do work within timelines.

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 resource allocation and resource schedule
- Describe process of hierarchy of the organization and communicate to concerned co workers and superiors.
- Describe Task allocation and timeline

11.2.4. Explain

- Describe resource allocation and resource schedule
- Describe process of hierarchy of the organization and communicate to concerned co workers and superiors.
- Describe Task allocation and timeline

11.2.5. Activity

Planning of Work

- **Objective:** To understand the process of work planning, including resource allocation, schedule management, and effective communication, while simulating real-world workplace scenarios.
- **Activity Setup:**
 - Divide the class into small groups (4-5 students per group).
 - Provide each group with a **hypothetical project scenario** (e.g., a construction project, event planning, manufacturing task, or research project) that involves tasks to be completed within a set timeframe.
 - Provide **planning tools**, such as:
 - A **Gantt chart template** or **work schedule template**.
 - A **resource list** (e.g., equipment, personnel, materials).
 - A **project timeline** that outlines the total time available and key milestones.
- **Instructions:**
 1. **Scenario Overview:**
 - Present each group with a detailed scenario of a project or task. For example, for a construction project, the scenario might include building a new office space within three months, with specific deadlines for tasks like foundation laying, electrical installation, and final inspection.
 - Emphasize that each group must plan the resources, schedule, and timelines effectively to complete the project successfully.
 2. **Work Breakdown:**
 - Each group should **break down the overall project** into smaller, manageable tasks or phases. For instance:
 - **Task 1:** Site preparation and foundation laying.
 - **Task 2:** Framing and structure work.
 - **Task 3:** Electrical wiring installation.
 - **Task 4:** Final inspection and project handover.
 - Assign responsibilities for each task (e.g., which team member or department will handle which task).
 3. **Resource Allocation:**
 - Identify the resources required for each task:
 - **Personnel:** Who will do what (e.g., skilled workers, managers, supervisors)?
 - **Equipment:** What tools or machinery are needed?
 - **Materials:** What materials (e.g., wood, cement, wiring) are required for the project?
 - Groups should allocate resources for each task, ensuring that the necessary items are available at the right time.
 4. **Timeline Creation:**
 - Using a **Gantt chart** or **work schedule**, groups must map out when each task will begin and end, taking into account dependencies (e.g., Task 2 cannot start until Task 1 is completed).
 - Ensure that they account for any potential delays, allowing some buffer time between tasks or key milestones.
 5. **Communication Plan:**

- Develop a **communication plan** to ensure all team members and stakeholders are informed about the work schedule and progress.
- Decide how to communicate with superiors or other departments (e.g., regular progress reports, meetings).
- Discuss how changes to the schedule or issues will be communicated and resolved.

6. Risk Assessment:

- Identify potential **risks** to the successful completion of the project (e.g., delays in material delivery, workforce shortages).
- Plan **mitigation strategies** to address these risks (e.g., backup suppliers, additional shifts, contingency time in the schedule).

7. Presentation:

- Each group presents their **work plan** to the class, including:
 - Breakdown of tasks and milestones.
 - Resource allocation plan.
 - Timeline and Gantt chart.
 - Communication strategy and risk management plan.
- After each presentation, encourage questions and feedback from the class on how the plan could be improved.

• Discussion:

- Discuss the importance of **effective work planning** in completing projects on time and within budget.
- Emphasize the role of **resource management, timeline adherence, and communication** in the success of any project.
- Discuss how unplanned risks or delays can affect the overall work plan and how to manage those risks proactively.

• Conclusion:

- Recap the essential components of **work planning**, including task breakdown, resource allocation, timeline management, and communication.
- Reinforce that planning is a critical skill for any professional and helps ensure that projects are completed efficiently, safely, and successfully.
- Encourage students to always consider potential risks and communication needs while planning work in real-world situations.

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

1. Resource and Schedule Planning:

Plan resources, schedules, and timelines based on work deadlines set by superiors.

2. Understanding Organizational Hierarchy:

Understand the hierarchy within the organization.

Communicate effectively with co workers and superiors according to the organizational structure.

3. Task Delegation:

Assign tasks to subordinates in alignment with project requirements and timelines.

11.2.8. Exercise

1. What is the first step in planning safety resources for a work task?

- A) Gathering feedback from team members
- B) Reviewing the overall work timelines and objectives
- C) Conducting a financial audit
- D) Allocating tasks to subordinates

2. What is the primary purpose of resource planning?

- A) To allocate tasks to employees
- B) To minimize costs
- C) To ensure resources are available when needed
- D) To increase profit margins

3. Which document typically outlines the project schedule?

- A) Project charter
- B) Statement of work
- C) Project management plan
- D) Risk management plan

4. Which term describes the resources needed to complete a project?

- A) Resource pool
- B) Resource allocation
- C) Resource capacity
- D) Resource requirement

5. True or False: In work planning, it is essential to consider worker skill levels and ensure adequate training for the tasks they will perform.

6. True or False: Work planning should avoid including safety protocols if the tasks seem simple or low-risk.

7. True or False: A detailed work plan helps in minimizing delays, reducing accidents, and increasing productivity.

11.3. Unit 7.2: Organizing of Work

11.3.1. Unit Objectives

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

- Resource collection and provisioning.
- Understand Communication Medium to concerned co workers and superiors.
- Briefing to subordinates about the schedule, sequence, timing and resources to subordinates

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 Resource collection and provisioning
- Describe process of hierarchy of the organization and communicate to concerned co workers and superiors.
- Describe process of Briefing to subordinates about the schedule, sequence, timing and resources to subordinates

11.3.4. Explain

- Describe Resource collection and provisioning
- Describe process of hierarchy of the organization and communicate to concerned co workers and superiors.
- Describe process of Briefing to subordinates about the schedule, sequence, timing and resources to subordinates

11.3.5. Activity

Organizing of Work

Objective: To understand the process of organizing work, focusing on resource collection, team communication, and task delegation to ensure efficient execution.

Activity Setup:

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

Provide each group with a hypothetical project that requires organizing work (e.g., organizing a company event, launching a new product, or completing a team task in a manufacturing setting).

Provide resources such as a resource list, a timeline, and a task delegation sheet.

Instructions:

Project Overview:

Present each group with a project scenario that requires organizing tasks and resources. For example:

Scenario 1: Organize an employee health and safety training seminar for 100 staff members.

Scenario 2: Organize a new product launch event that includes product display, marketing, and customer engagement.

Scenario 3: A factory maintenance project that involves machine inspection, repair, and quality control.

Identify Resources:

Instruct each group to identify the resources needed for their project:

Personnel: Who will do what? (E.g., team leaders, helpers, specialists).

Materials/Equipment: What materials or tools are required? (E.g., seminar materials, decorations, machinery).

Time: How much time is allocated for each task? (E.g., deadlines for completing specific project phases).

Task Delegation:

Groups should delegate tasks to each team member based on skills and available resources.

Discuss who will be responsible for specific tasks (e.g., one person may handle event logistics, another may be in charge of communications).

Ensure that tasks are evenly distributed and that every member knows their responsibilities and deadlines.

Develop a Task Schedule:

Each group creates a task schedule that outlines when each task will begin and end, who will handle it, and any dependencies (e.g., Task B cannot start until Task A is completed).

Use a work schedule template to visualize the sequence of tasks.

Emphasize the importance of setting realistic deadlines and allocating time for contingencies.

Communication Plan:

Discuss how communication will take place among team members and superiors.

How will progress be tracked and reported? (E.g., weekly meetings, progress updates).

How will issues or delays be communicated and addressed?

Risk Management:

Each group should consider potential risks that could disrupt the project (e.g., a supplier delay, unexpected absences) and develop contingency plans.

For example, if an equipment breakdown occurs, the team should have an alternative vendor or maintenance procedure.

Final Presentation:

Each group will present their organized work plan to the class, covering:

Key resources needed (personnel, materials, time).

How tasks were delegated and why.

The task schedule and timeline.

The communication plan and risk management strategies.

Encourage classmates to ask questions and give feedback on how the organizing process could be improved.

Discussion:

Discuss the importance of organizing work effectively for successful project execution.

Highlight the role of delegating tasks based on skills, available resources, and time constraints.

Emphasize the importance of clear communication and monitoring progress to ensure all tasks are completed on time.

Conclusion:

Recap the key steps in organizing work: identifying resources, delegating tasks, creating schedules, and planning communication and risk management.

Reinforce that organizing work is essential for maximizing efficiency and ensuring project success.

Encourage students to use these organizational principles in their future professional tasks to improve teamwork and productivity.

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**1.Resource Collection and Provisioning:**

Collect and provide necessary resources for the tasks at hand.

2.Effective Communication:

Communicate relevant information to co-workers and superiors.

3.Briefing Subordinates:

Brief subordinates about the work schedule, task sequence, timing, and available resources.

11.3.8. Exercise

1. What is the primary purpose of resource collection in project management?

- A) To allocate tasks
- B) To gather necessary materials and inputs
- C) To create budgets
- D) To schedule meetings

2. What is the first step in resource collection?

- A) Allocation of resources
- B) Identifying resource needs
- C) Distribution of resources
- D) Evaluation of resources

3. What is the first step in the resource provisioning process?

- A) Allocating resources
- B) Identifying resource requirements
- C) Monitoring resource usage
- D) Reporting resource status

4. What is the best way to ensure your message is understood by co-workers?

- A) Use technical jargon
- B) Keep the message concise and clear

C) Avoid summarizing key points

D) Speak quickly

5. True or False: It is not necessary to assign clear responsibilities for safety and emergency procedures when organizing work.

6. True or False: Organizing work includes scheduling tasks in a way that optimizes productivity without compromising safety.

7. True or False: Organizing work should only focus on the efficiency of the process and not on the health and safety of the workers.

11.4. Unit 7.3: Monitoring of Work

11.4.1. Unit Objectives

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

- Understand process of monitoring progress of work, management of resources, guidance to subordinates.
- Understand process of reporting to superiors and keeping the other teams informed.
- Documentations and compliances and report submission.

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 process of monitoring progress of work, management of resources, guidance to subordinates
- Describe about process of reporting to superiors and keeping the other teams informed
- Describe importance of Documentations and compliances and report submission

11.4.4. Explain

- Describe about process of monitoring progress of work, management of resources, guidance to subordinates
- Describe about process of reporting to superiors and keeping the other teams informed

Describe importance of Documentations and compliances and report submission

11.4.5. Activity

Monitoring of Work

- **Objective:** To understand the process of monitoring work, ensuring tasks are completed as planned, and addressing issues in real-time to ensure efficiency and quality.
- **Activity Setup:**

- Divide the class into small groups (4-5 students per group).
- Provide each group with a **project scenario** that involves multiple tasks and objectives. Examples could include:
 - Organizing a conference or event.
 - Managing a product launch.
 - Completing a construction project or factory maintenance task.
- Distribute **monitoring tools**, such as a **progress tracking sheet**, **performance checklist**, and **issue resolution template**.
- **Instructions:**
 1. **Scenario Overview:**
 - Present a project scenario where the group needs to **monitor progress** and ensure that tasks are completed on time and according to quality standards. For example:
 - **Scenario 1:** You are managing a team to plan and organize a corporate training event. The team has various tasks like booking the venue, creating materials, sending invitations, and arranging catering.
 - **Scenario 2:** You are overseeing a construction project. The tasks include scheduling deliveries, organizing team work shifts, and ensuring safety protocols are followed.
 - Each group is tasked with organizing and monitoring the project to ensure all tasks are completed as planned.
 2. **Task Breakdown:**
 - Ask each group to break down the project into smaller tasks. For example:
 - **Task 1:** Booking the venue for the event.
 - **Task 2:** Sending invitations to participants.
 - **Task 3:** Preparing presentation materials.
 - **Task 4:** Setting up the venue and arranging logistics.
 - Assign specific tasks to each group member, ensuring that they each have clear responsibilities.
 3. **Establish Monitoring Criteria:**
 - Instruct each group to establish clear **monitoring criteria** for each task. For example:
 - What is the **deadline** for each task?
 - What are the **quality standards** to be met?
 - What are the **key milestones** for checking progress?
 - Use a **progress tracking sheet** to track whether the tasks are on schedule, on budget, and meeting quality standards.
 4. **Monitor Progress:**
 - Each group should regularly **monitor the progress** of the tasks:
 - Conduct regular **check-ins** (e.g., weekly or bi-weekly) to ensure that the tasks are being completed on time.
 - **Compare the progress** with the original plan (e.g., check if task deadlines are being met).
 - Use the **performance checklist** to evaluate if tasks are being performed correctly and according to the defined quality standards.
 - Address any issues that arise, such as:
 - **Delays:** If a task is behind schedule, what corrective actions will be taken?

- **Quality issues:** If the work doesn't meet the expected quality, how will you address it?
 - 5. **Issue Resolution:**
 - Each group will need to deal with hypothetical **issues** that could arise during the project. For example:
 - **Issue 1:** Task 2 (sending invitations) is delayed because the contact list wasn't updated on time.
 - **Issue 2:** Task 4 (venue setup) is being delayed due to supplier delivery problems.
 - Use the **issue resolution template** to propose solutions for the issues, such as:
 - Reassigning tasks.
 - Extending deadlines.
 - Procuring alternative resources.
 - 6. **Final Report:**
 - At the end of the activity, each group will **present a report** that includes:
 - A summary of the **tasks assigned** and their deadlines.
 - The **monitoring process** used to track progress and ensure quality.
 - Any **issues encountered** and how they were resolved.
 - Final assessment of whether the project was completed on time and met quality standards.
 - Groups should highlight the **lessons learned** from the monitoring process, such as:
 - The importance of early issue identification.
 - The need for clear communication within the team.
- **Discussion:**
 - Discuss the importance of **monitoring work** to ensure it stays on track and meets quality standards.
 - Explore different **monitoring techniques**, such as setting clear objectives, tracking progress, and holding regular check-ins.
 - Highlight the need for **flexibility** in monitoring and adjusting the plan as issues arise.
- **Conclusion:**
 - Recap the key steps in **monitoring work**, including setting clear tasks, establishing criteria, tracking progress, addressing issues, and adjusting plans.
 - Reinforce that monitoring is essential to ensure that work is completed efficiently, on time, and to the required standard.
 - Encourage students to apply these **monitoring techniques** in future projects to improve team performance and project outcomes.

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

1. Track Progress:

Continuously monitor the progress of tasks and projects against set timelines and goals.

2.Ensure Compliance:

Ensure work is being carried out according to established procedures, safety standards, and quality guidelines.

3.Identify Issues:

Identify any delays, resource shortages, or obstacles and address them promptly.

4.Provide Support:

Offer assistance or guidance to team members as needed to ensure smooth workflow.

5.Report Status:

Regularly report work progress to superiors and stakeholder

11.4.8. Exercise

1.What role does leadership play in monitoring work?

- A) It is irrelevant
- B) It sets the tone for accountability and support
- C) It complicates processes
- D) It should be avoided

2. What is the primary purpose of monitoring progress in a project?

- A) To assign blame for delays
- B) To ensure tasks are completed on time and within budget
- C) To ignore issues as they arise
- D) To complicate project management

3. Which of the following is a key indicator of project progress?

- A) Employee satisfaction
- B) Milestone completion
- C) Office atmosphere
- D) Social media engagement

4.True or False: Organizing work should consider the availability of resources, including tools, materials, and equipment, to avoid delays or inefficiencies.

5. True or False: It is not necessary to assign clear responsibilities for safety and emergency procedures when organizing work.

6. True or False: Organizing work includes scheduling tasks in a way that optimizes productivity without compromising safety.

11.5. Emergency Protocols

11.5.1. Unit Objectives

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

- Set up medical emergency measures, in case of accidents/incidents at the workplace.
- Set up fire emergency measures as per plans in case of any fire accidents at the workplace.

- Set up emergency assembly area, evacuation plan, sign boards and guidance

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 process of medical emergency measures, in case of accidents/incidents at the workplace.
- Describe about process of fire emergency measures
- Describe importance of emergency assembly area, evacuation plan, sign boards and guidance

11.5.4. Explain

- Describe about process of medical emergency measures, in case of accidents/incidents at the workplace.
- Describe about process of fire emergency measures
- Describe importance of emergency assembly area, evacuation plan, sign boards and guidance

11.5.5. Activity

Divide the class into small groups and assign each group a workplace accident scenario (e.g., a chemical spill, electrical shock, or severe bleeding).

Have the groups discuss and create a detailed Medical Emergency Response Plan, including:

Immediate steps to take in their scenario.

How to access and use first aid supplies.

Communication protocols (e.g., who to call for help and how).

The roles and responsibilities of employees in the medical emergency response.

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

1. Set Up Medical Emergency Measures

Setting up medical emergency measures at the workplace is crucial to ensuring prompt and effective response in the event of accidents or incidents. This includes having a well-stocked First Aid Kit, designated first aid responders, and an organized system for medical emergencies. Emergency

contacts, procedures for assessing and treating injuries, and clear instructions on how to seek medical assistance should all be in place. Additionally, regular training and drills are important to maintain preparedness in dealing with various medical emergencies, ensuring quick and efficient response when accidents occur.

2. Set Up Fire Emergency Measures

Fire safety at the workplace is vital to minimize the risks of fire hazards. Setting up fire emergency measures involves identifying fire hazards, providing accessible fire extinguishers, and ensuring that fire alarms and fire exits are in place. A comprehensive fire emergency plan should be developed, which includes evacuation routes, emergency contacts, and roles assigned to staff members (e.g., fire marshals). Regular fire drills are essential for ensuring that everyone is familiar with evacuation procedures and can act quickly in case of a fire emergency.

3. Set Up Emergency Assembly Area, Evacuation Plan, Sign Boards, and Guidance

An evacuation plan is essential for guiding individuals to safety during emergencies, whether fire-related or other critical incidents. The workplace should have designated emergency assembly areas away from potential hazards. Clear signage and guidance are necessary for directing employees to these assembly areas and safe exits. Evacuation routes should be well marked, easily accessible, and designed to accommodate all employees, including those with special needs. Regular practice drills are also important to ensure employees are familiar with the evacuation process and can follow the procedures efficiently in case of an emergency.

11.5.8. Exercise

1. Which of the following is a key component of setting up medical emergency measures at the workplace?

- a) First Aid Kit
- b) Fire extinguishers
- c) Emergency assembly area
- d) Security cameras

2. What should be included in a fire emergency plan at the workplace?

- a) A list of employees
- b) Locations of fire exits and extinguishers
- c) Employee break times
- d) Parking lot layout

3. What is the primary purpose of an emergency assembly area?

- a) To store emergency medical supplies
- b) To gather employees during an evacuation
- c) To provide refreshments during emergencies
- d) To conduct safety drills

4. In the event of a fire, employees should follow the _____ to evacuate the building safely.

5. The _____ is designated as a safe area where employees should gather after evacuating the workplace during an emergency.

6. A fire emergency plan should include clear instructions about the location of _____, fire exits, and emergency contact information.

7. True or False: All employees should be familiar with the workplace's emergency evacuation routes and assembly areas.

8. **True or False:** In case of fire, it is important to use the nearest exit and not to wait for instructions.

12. Unit 12 NOS 11: 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 8.1: 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:**
Understand the key skills and attributes required for gaining employment or self-employment.
- 2. Create Effective Job Search Strategies:**
Learn to develop a professional resume, cover letter, and online profiles.
- 3. Prepare for job interviews and networking opportunities.**
Explore Self-Employment Opportunities:
- 4. Identify potential self-employment ideas and business opportunities.**
Understand the basics of starting and managing a small business.
- 5. Understand Employment Rights and Responsibilities:**
Gain knowledge of workplace rights, legal requirements, and professional ethics.
- 6. Enhance Personal Branding:**
Build and enhance personal branding for career advancement and self-promotion.
- 7. Develop Financial and Organizational Skills:**
Learn essential financial planning and organizational skills for managing a job or business.

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 – Situation 2

- 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 8.2. 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

Quiz Questions

1. Who is the founder of Reliance Industries?

Dhirubhai Ambani

2. Who is the Chairman of Wipro Limited?

Azim Premji

3. Who launched e-commerce website Flipkart?

Sachin Bansal and Binny Bansal

4. Who is the founder of Paytm?

Vijay Shekhar Sharma

5. CEO OLA Who is of Cabs?

Bhavish Aggarwal

6. Who is the founder of Jugnoo?

Samar Singla (autorickshaw aggregator)

7. OYO Who is the founder of Rooms?

Bhavish Aggarwal

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.