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HSSC
HYDROCARBON SECTOR
SKILL COUNCIL

Facilitator Guide



Sector
Hydrocarbon

Sub-Sector
Midstream

Occupation
Pipeline Maintenance

Reference ID: **HYC/Q6402, V1.0**
NSQF Level 4

Pipeline Maintenance Technician (Mechanical)

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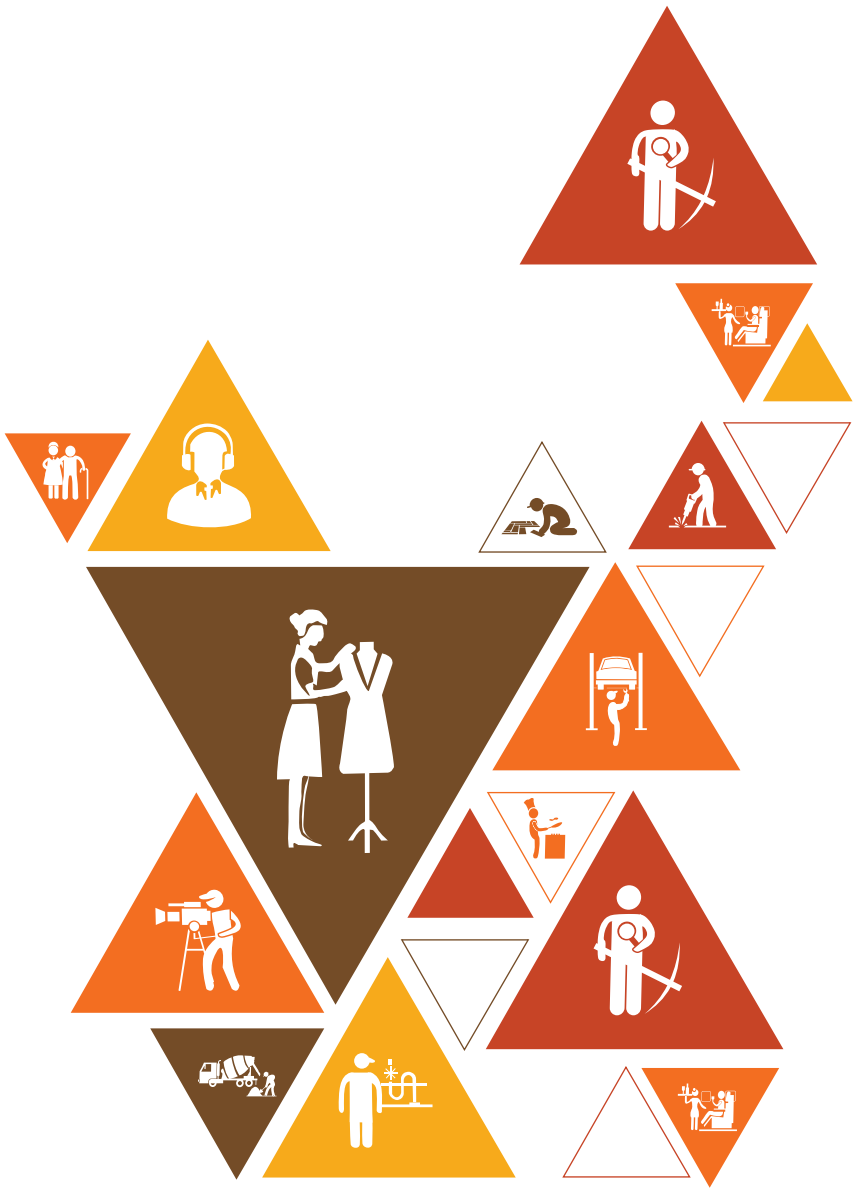
Printed in India at

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

Shri Narendra Modi
Prime Minister of India



Acknowledgments

We would like to express our heartfelt gratitude to everyone, who in their own capacities or on behalf of their esteemed organisations, have contributed in various ways towards the development of this "Facilitator Guide" for Hydrocarbon Sector Skill Council (HSSC). This will go a long way in our endeavour to support the "SKILL INDIA" initiative.

The contents of this book are aligned to the Qualifications Pack - National Occupational Standards (QP NOS).

This Facilitator Guide is dedicated to the passionate trainers who are committed to quality and excellence in the "Hydrocarbon" sector.

About this Guide

This Facilitator Guide is designed to enable training for the specific Qualification Pack (QP). Each National Occupational (NOS) is covered across Unit/s.

Key Learning Objectives for the specific NOS mark the beginning of the Unit/s for that NOS.

- **HYC/N6402** Prepare for repair and maintenance activities of the equipment.
- **HYC/N6403** Carry out repair, maintenance and testing of equipment in oil & gas pipeline.
- **HYC/N9301** Working effectively in a team.
- **HYC/N9302** Maintain health, safety and security procedures.

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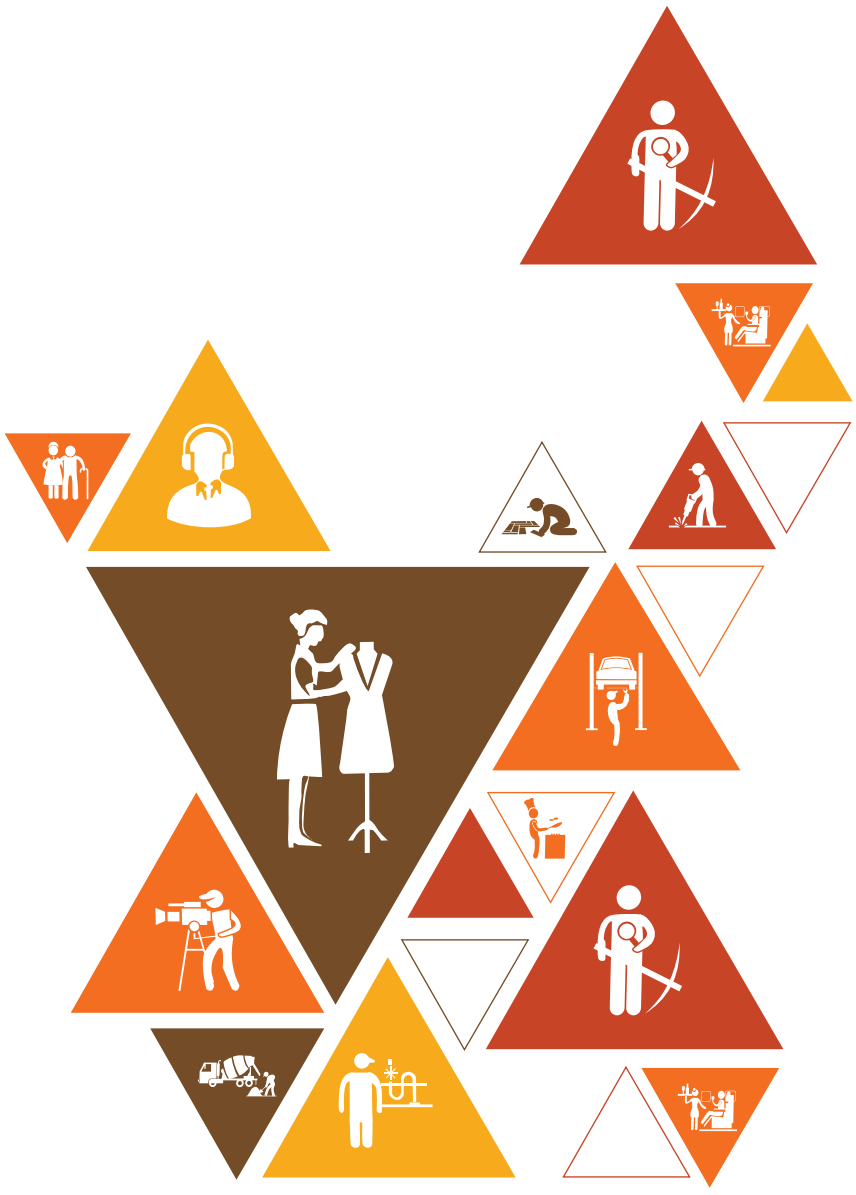

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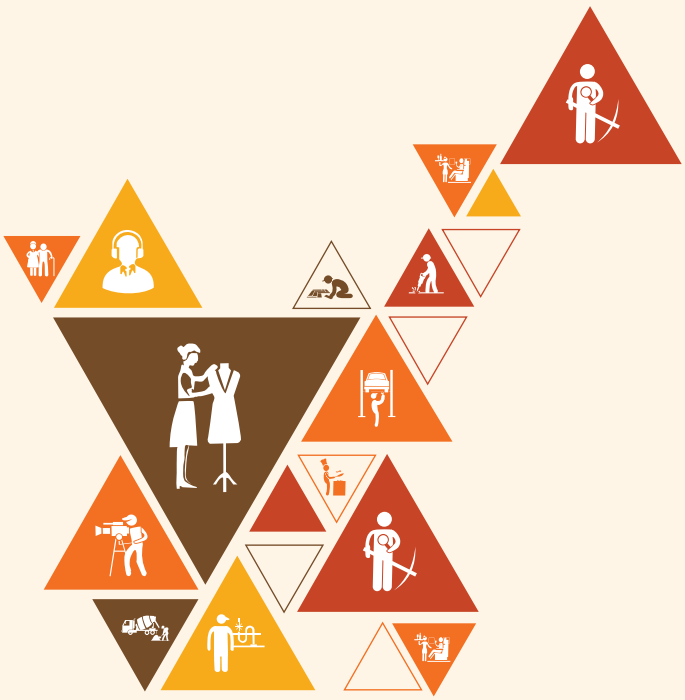
1. Introduction to Hydrocarbon Sector

Unit 1.1 - Hydrocarbon Sector in India

Unit 1.2 - Roles and Responsibilities of a Pipeline Maintenance Technician



Key Learning Outcomes

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

1. Describe the oil and gas sector and its sub-sectors.
2. List the three major segments in the hydrocarbon sector.
3. State the functions of upstream, midstream and downstream segments.
4. Describe the role of the Hydrocarbon Sector Skill Council.
5. List OISD standards.
6. List the roles and responsibilities of a fire safety technician.

Unit 1.1: Hydrocarbon Sector in India

Unit Objectives

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

1. Describe the hydrocarbon sector in India.
2. List the three major segments in the hydrocarbon sector.
3. Identify the investments in the hydrocarbon sector.
4. Illustrate the initiatives taken by the government for the hydrocarbon sector.

Resources to be used

- Whiteboard pen, notebook etc.
- Flip chart
- Participant Handbook\ handouts
- LCD projector
- Attendance sheet

Ask

- Ask the participants to share their expectations from the program.
- Ask them to tell what they know about the Hydrocarbon sector.

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 in India.

Explain

- List the three major segments in the hydrocarbon sector.
- State the functions of upstream, midstream and downstream segments.
- Describe the role of the Hydrocarbon Sector Skill Council.

Notes for Facilitation

- Make sure that each participant understands the session objectives.
- Answer questions and explain what seems confusing.
- Assess each participant's work and contributions.
- Ensure that participants have mastered the skills listed at the beginning of each session.
- Help participants identify how to apply the skills taught in the course to their work.
- Give guidance and feedback as needed during classroom and practical sessions.

Activity

Activity Name	Practice Public Communication Skills
Objective	Strengthen social interaction
Material Required	Pen, Notebook
Time required for Activity	1 Hour
Steps of Activity	• Social interaction is always necessary between trainers and participants. • Divide the participants into pairs and ask each pair to share their general information (name, hometown, hobbies etc.) with their partner. • Next, you may ask a question to anyone from each pair to tell about his/her partner. • In this exercise, the trainer and the participants get to know each other.
Inference	Participant will be able to communicate clearly and build team rapport

Tips

- Go slow with information flow with participants.
- Observe each participant's body language.
- Keep a positive and supportive approach towards the candidates.
- Idea is to develop warmth and establish interpersonal communication and rapport and team spirit.
- Facilitate informal communication among participants.

Exercise

1. India's oil refining capacity was 249.9 million metric tons (MMT) as of October 1, 2020, making it the second largest refiner in Asia. (Answer: **True**)
2. In 2011, India became the fourth largest importer of Liquefied Natural Gas (LNG), after Japan, South Korea, and China. (Answer: **True**)
3. Production is another term used to describe the actual drilling and bringing of oil and natural gas to the surface, occasionally referred to as **'upstream'**.
4. **Oil and natural gas** products are even used to make artificial limbs, hearing aids and flame-retardant clothing to protect fire-fighters.
   a) Oil and natural gas
   b) Crude oil and natural gas
   c) LPG and natural gas
   d) Kerosene and heating oil
5. The full of OISD is **Oil Industry Safety Directorate**

Notes

Unit 1.2: Roles and Responsibilities of a Pipeline Maintenance Technician

Unit Objectives

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

1. Identify roles and responsibilities of pipeline maintenance technicians.
2. Identify essential skills and knowledge required by pipeline maintenance technicians.

Resources to be used

- Whiteboard, pen, notebook etc.
- Flip chart
- Participant Handbook\ handouts
- LCD projector
- Attendance sheet

Ask

- Ask the participants to share their expectations from the program.

Do

- Give a brief introduction on the job description of Pipeline maintenance technicians outlining their attributes to the participants.
- Provide the participants with a list of roles and responsibilities of pipeline maintenance technicians.
- Talk about the skills and knowledge which are essential to becoming a Pipeline maintenance technician.

Explain

- Describe the Working Conditions of pipeline maintenance technicians.

Tips

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

Activity: Team Spot

Activity Name	Team Show
Objective	Learn the roles and responsibilities of pipeline maintenance technician
Material Required	Pen, Notebook, Blackboard
Time required for Activity	1 Hour
Steps of Activity	• Separate the class into 2 different teams. • **Each team will be assigned 3 topics, being:** - Roles and responsibilities of Pipeline Maintenance Technician. - Career opportunities and skills required. • Ask them to present the given topics team after team, and state examples individually to explain.
Inference	The candidate will be able to learn about job role of Pipeline maintenance technician, skills required, their career opportunities and strengthen their presentation skills.

Notes for Facilitation

- Revise the important points discussed in this unit.
- Clear the doubts of the participants, 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 for 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.

Summary

- The oil and gas industry includes different processes of exploring and extracting, collecting and processing and ultimately distributing the oil and natural gas for use.
- The energy sector has three key areas, upstream, midstream and downstream.
- Upstream involves the search for underwater and underground natural gas fields or crude oil fields.
- Midstream entails the transportation, storage, and processing of oil and gas.
- Downstream means refining crude oil and purifying natural gas.
- The Government is planning to set up around 5,000 compressed biogas (CBG) plants by 2023.
- Crude oil consumption is expected to grow at a CAGR of 3.60% to 500 million tonnes by 2040.
- Natural Gas consumption is forecast to increase at a CAGR of 4.18% to 143.08 million tonnes by 2040.
- Diesel demand in India is expected to double to 163 million tonnes (MT) by 2029-30.
- A pipeline Technician is responsible for the maintenance and correct operation of an oil or gas pipeline system.
- Operation and control, critical thinking, equipment maintenance, quality control analysis are a few skills of a pipeline technician.

Exercise

1. Write any two roles and responsibilities of a Pipeline maintenance technician.

Answer:

- **Schedules maintenance and surveys of pipelines and relevant equipment.**
- **Performs pipeline rectifier system operations and maintenance.**

Scan the QR codes or click on the link to watch the related videos

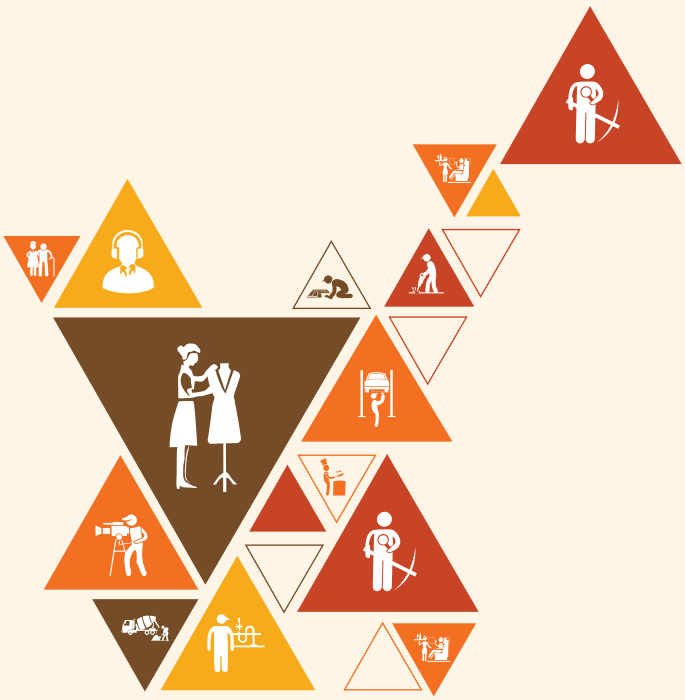
https://youtu.be/W-PooTpdcyw

The People Behind The Pipeline

2 Prepare for Repair and Maintenance Activities of the Equipment

Unit 2.1 - Introduction to crude oil

Unit 2.2 - Equipment and machines



HYC/N6402

Key Learning Outcomes

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

1. Identify the oil and gas pipeline equipment that is meeting its safety and technical standards.
2. Examine the identified defect/damage in equipment/machine.
3. Follow the maintenance manual of the machine and equipment requiring maintenance or repair.

Unit 2.1: Introduction to Crude Oil

Unit Objectives

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

1. Identify the origin and processes of crude oil.
2. Identify the Natural Gas Processes.
3. Describe the pipelines and their various types.

Resources to be used

- Whiteboard, pen, notebook etc.
- Flip chart
- Participant Handbook\ handouts
- LCD projector
- Attendance sheet

Do

- Greet and welcome the participants to the next session of the program.
- Before starting the session ask them if they have any doubts pertaining to the previous unit.
- Capture their responses on board and share them wherever necessary.
- Tell them that they will learn about crude oil, natural gas and related processes.

Say

- What is crude oil and Natural gas.
- Basic functions of refineries.
- Natural gas transport.
- Natural gas storage.

Explain

- The crude oil refining process.

- Natural gas processing and its stages.
- Different types of pipelines and their purpose.

Activity

Activity Name	Guess the answer
Objective	The objective is to help people working in groups acquire problem-solving, creativity, and strong communication skills.
Material Required	Pen, Notebook
Time required for Activity	1 Hour
Steps of Activity	• Have participants divided into groups and ask them to choose a topic from the given topics. • Crude oil processing, Natural gas processing, Natural gas transport, Natural gas storage, pipeline used in natural gas and crude oil processing. • Now ask each group to explain any of the above-given topics. • Instruct other groups to create any 3 or more questions while the presentation is happening. • At the end, when all the groups have presented their topics, each group will present their questions prepared from the other group's presentation. • Now it is the job of the trainer to correct any mistakes in the presentation or question-answer round, and clear participants' doubts. • Once the correction round is complete announce the winner for the presentation and question-answer round.
Inference	This activity forces the group to think of creative ways to work as a team and solve the problem without getting off the sheet. This activities also give a way to revise their concepts related to the job role.

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.

Exercise

1. _____ formed from the remains of dead organisms that existed millions of years ago in a marine environment.

   Answer: b) Crude Oil

2. _____ activities involve exploring for crude oil deposits and the production of crude oil.

   Answer: b) Upstream

3. Which one of the following is not a type of pipeline system in the oil and gas industry?

   Answer: d) Gathering product pipelines

4. These types of lines collect oil and gas from several locations for delivery to central accumulating points, such as from field crude oil tanks and gas plants to marine docks.

   Answer: b) Gathering and feeder lines

Notes

Unit 2.2: Equipment and Machines

Unit Objectives

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

1. Identify what a work permit is and how to obtain the work permit from the concerned department/ authority.
2. Identify the different types of equipment and machines used and are meeting its safety and technical standards.
3. Examine the identified defect/damage in equipment/machine.

Resources to be used

- Whiteboard, pen, notebook etc.
- Flip chart
- Participant Handbook\ handouts
- LCD projector
- Attendance sheet

Do

- Ask participants to share their views on ways to keep people safe.
- Give participants some time to think.
- Brainstorm on the work permit system and why it is necessary.
- Write down all the responses of participants on the board.
- Discuss all the points shared by participants.
- Give a brief overview of equipment and machines used in the hydrocarbon industry.

Say

- Give the participants a detailed overview of the Work permit system.
- Introduce the participants to the types of a work permit system.
- Give a brief overview of Pressure vessels, Reflux vessels, Boilers.
- Discuss electrical equipment used in the industry.
- Talk about Piping and valves.

Explain

- What are Storage tanks.
- Pumps used in the hydrocarbon industry.
- Compressors and their parts.
- Heat Exchangers and their types.
- What are Fire heaters.
- Internal Combustion Engines.
- Pressure Relief Devices.
- Process hazards.
- Different types of hazards in the industry such as process hazards, hazards of utilities, hazards of steam, hazards of air, Hazards of Equipment and Instruments, Hazards of piping, valves, and hoses.
- Repair techniques for the hazards.
- Control & Monitoring Instrumentation for Oil & Gas.

Activity

Activity Name	Knowledge Race
Objective	The objective is to let employees get out of their comfort zone and work as a team. It also helps with working with new team members.
Material Required	Pen, Notebook
Time required for Activity	1 Hour
Steps of Activity	• Divide the class into two groups. • Now ask each participant of the group to choose their contender from the opposite group (No two participants will select the same person). • Now ask each participant to choose a topic and prepare any 4 questions from the topic (the answer should be found in the book) and challenge their contender to find the answer (Give 10 minutes to find the answers) and explain it to the whole class. • This will go on for the whole class. • For each correct answer of the contender, the participant will get +5 marks and for each negative answer the contender will get -3 marks and the participant will have to explain the unanswered question. • At the end of the complete session, all marks will be added and the participant with the maximum marks will win.

Inference	By the end, the team will realize how every team member's participation is essential to success. When they work together as a team, new strategies are developed to solve the problem at hand, and the confidence level of each other rises. The key topics of this chapter can also be revised through this activity.

Notes for Facilitation

- Review the objectives of the workshop.
- Give relevant information to participants and go slow in transferring it.
- Clear the doubts of the participants, if any. Encourage them to ask questions.
- Revise the important points discussed in this unit.
- Observe each participant's body language.
- Encourage participation.
- Conduct a simple test at the end of the topic to check the understanding of each topic.

Summary

- Crude oil is a naturally occurring, unrefined petroleum product and can be refined to produce usable products such as gasoline, diesel, and various other forms.
- Crude oil is formed from the remains of dead organisms that existed millions of years ago in a marine environment.
- After the extraction of crude oil from the ground, it must be transported and refined into petroleum products that have some value.
- The basic functions of the refinery have three chemical processes: distillation, cracking and reforming.
- Natural gas moves from natural gas and oil wells through a gathering system of pipelines to natural gas processing plants for treatment.
- The basic stages of natural gas processing/treatment are Gas-oil-water separators, Condensate separators, Dehydration, Contaminant removal, Nitrogen extraction, Methane separation, and fractionation.
- Flow lines move crude oil or natural gas from producing wells to producing field storage tanks and reservoirs.
- Gathering lines collect oil and gas from several locations for delivery to central accumulating points.
- Natural gas and crude oil are moved long distances from producing areas to refineries and from refineries to storage and distribution facilities by 1- to 3-more larger-diameter trunk pipelines.

- **Petroleum product trunk pipelines** move liquid petroleum products such as gasoline and fuel oil from refineries to terminals, and from marine and pipeline terminals to distribution terminals.
- Product pipelines are used to move LPG from refineries to distributor storage facilities or large industrial users.
- **The hot work permit** is issued for work that involves the application of heat or sources of ignition to vessels or equipment which may contain or have contained flammable vapour.
- **A cold work permit** is issued for work involving hazardous activities which are not covered by a hot work permit.
- **The electrical work permit** is used when working on a piece of equipment or a circuit that is safe.
- **Confined spaces entry certificates** are used when entry to a confined space is essential for work to be done.
- Pressure vessels are leak-proof containers that store liquid or gas.
- Reflux vessels feed cool liquid to columns and vessels.
- Pumps are at the heart of all process facilities. They are also a source of hazards because they have moving parts and a seal between their contents and the atmosphere.
- There are different types of heat exchangers, shell and tube heat exchangers, air-cooled exchangers
- Fired heaters transfer is used when the process material has to be heated to a high temperature.
- Internal combustion engines have many applications in both stationary and mobile equipment, **large stationary engines**, mobile engines fueled by gasoline, diesel, or LPG are some of the types, cooling towers, etc.
- Blinds, also known as blanks or spades, Blinds provide positive isolation between sections of a process.
- Valves are used to stop and/or control the flow of fluid in piping systems. The different types of valves are block valves, self-closing valves, check valves, emergency isolation valves, excess flow valves.
- The lighting of fired heaters always has the potential to create an explosion.
- In case of pipe class changes, it is important to make sure that the lower grade of steel is not located too near the more severe service.
- A hydraulic hammer is created by stopping and/or starting a liquid flow suddenly.
- When base metal or welds contain fabrication or service-induced defects (weld flaws, arc burns, gauges or cracks), these defects can be excavated by grinding, under certain conditions.
- A mechanical clamp is a housing comprised of two half-shells, with two end gasket rings that are tightened against the pipe's outer diameter by bolting.
- Instrumentation is used to monitor and control the process plant in the oil, gas and petrochemical industries. The instrumentation comprises sensor elements, signal transmitters, controllers, indicators and alarms, actuated valves, logic circuits and operator interfaces.

Exercise

1. It is a document that sets out the work to be done, and precautions to be taken for all foreseeable hazards.

   Answer: c) Work Permit System

2. This type of permit is used when working on a piece of equipment or a circuit that is safe.

   Answer: c) Electrical work permit

3. These are the leakproof containers that stores liquid and gas.

   Answer: b) Pressure vessels

4. These valves are used to totally stop the flow of liquid or gas through a pipe.

   Answer: b) Block valves

5. These are used where failure to close a valve manually might permit flow of oil or gas into areas where a serious fire may result.

   Answer: a) Self-Closing Valves

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/6ozmKhahk8M
Fundamentals of upstream, midstream, and downstream

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/cXnHOOTCrKY
Crude-oil distillation in a refinery

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/QgtSoEJD9HE
Turning natrual gas into liquid

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/PenuYdMm3Wg
Natural Gas 101: Natural Gas Transportation

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/Gap_IhBIrGI
How are pipelines constructed?

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/_aNY6mV6ggE
Work permit system | Types of work permit | validity of work permit

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/-On1mpWlHpk
Pipeline leak repair clamps

Notes

Notes

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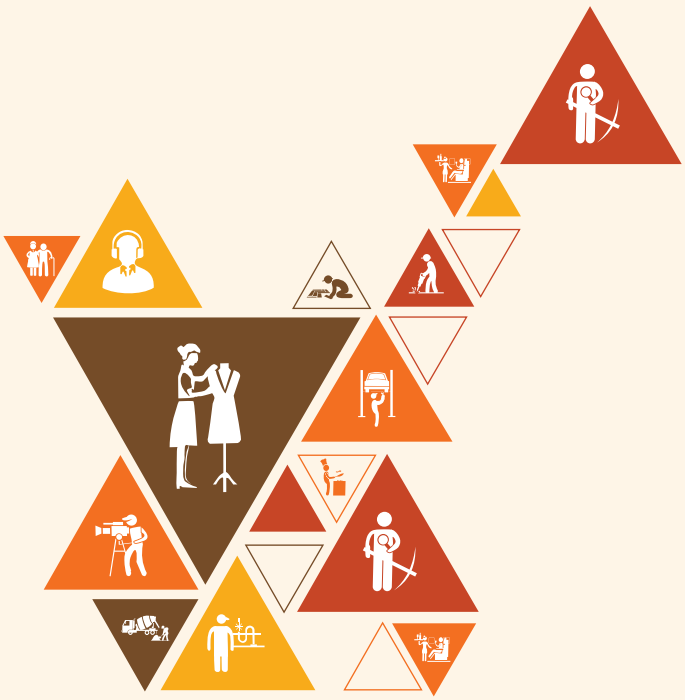
3 Carryout Repair, Maintenance and Testing of Equipment in Oil & Gas Pipeline

Unit 3.1 - Carry out repair and preventive maintenance

Unit 3.2 - Testing of equipment & machine after repair



HYC/N6403

Key Learning Outcomes

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

1. Carry out repair and preventive maintenance.
2. Perform 5S activities post-repair and maintenance.
3. Prepare the repair and maintenance report and submit it to the supervisor.

Unit 3.1: Carry out Repair and Preventive Maintenance

Unit Objectives

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

1. Identify sources of fire and firefighting equipment.
2. Identify firefighting procedures.
3. Identify various PPE used in fire emergencies.
4. Demonstrate an appropriate method to extinguish the fire.

Resources to be used

- Whiteboard, pen, notebook etc.
- Flip chart
- Participant Handbook/handouts
- LCD projector
- Attendance sheet

Do

- Greet and welcome the participants to the next session of the program.
- Before starting the session ask them if they have any doubts pertaining to the previous unit.
- Acknowledge their responses and clear their doubts if any.
- Tell them they are going to learn about Repair and Preventive Maintenance in the oil and gas industry.

Say

- Give the participants a detailed overview of different types of maintenance.
- Talk about the Correct Use of a Fire Extinguisher.
- Explain the Methods of Starving Fire.
- Discuss Fire Emergency Procedures (Dos & Don’ts).
- Talk about Fire Evacuation Steps.
- Give a brief overview of Emergency Evacuation Procedures.
- Describe the purpose of drills, evacuation, and rollcalls.

Explain

- Maintenance task organization.
- Different types of tests are conducted in the hydrocarbon industry to check the proper functioning of equipment such as pressure tests, tightness tests, strength tests.
- Testing procedures of equipment in the hydrocarbon industry.

Activity

Activity Name	PPE Game
Objective	The objective of this activity is to teach participants about different PPE required at workplace and how to use them
Material Required	Pen, Notebook
Time required for Activity	1 Hour
Steps of Activity	• Ask the class about what they know about PPE and what are the types of PPE used in the Hydrocarbon Sector. • Divide the class into pairs of two and ask each student to choose any PPE and Represent themselves as that PPE, say, Safety Glasses, Foot protection, Different types of gloves, Head protection. • Now ask each student to explain the function of his/her partners' PPE and their benefits to the whole class. • Repeat the process for the whole class and correct any mistakes at the end of the activity.
Inference	After the completion of this activity, participant will strengthen their knowledge of the PPE required when working with the hazardous materials/tools/equipment while at workplace.

Notes for Facilitation

- Gather and organize the supplies and other items needed for all the activities scheduled for the day.
- Encourage participants to follow all the ground rules of the activity and maintain decorum.
- While the participants are doing the activity, go around and make sure they are doing it properly.
- Assess each participant's work and contributions.
- Provide help wherever the participants are unable to understand the question.

Exercise

1. Which one of the following is not a type of maintenance?

   Answer: b) Rework

2. This type of maintenance uses a risk-based approach to organizing maintenance activities

   Answer: c) Reliability-centered maintenance

3. Which one of the following is a test that is conducted after the item was opened for cleaning, inspection, or routine maintenance.

   Answer: b) Pressure tests

4. A _____to inspection helps ensure that resources are allocated as effectively as possible.

   Answer: b) Risk-based approach

Notes

Unit 3.2: Testing of Equipment & Machine After Repair

Unit Objectives

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

1. Identify appropriate ways to manage fire caused due to oil spills or gas leakage.
2. Perform checks for open or damaged valves in case of fire due to oil spills or gas leakage.
3. Identify fire and explosion strategy.
4. Demonstrate usage of alarms.
5. Demonstrate first aid techniques in the case of inhalation of toxic gas.

Resources to be used

- Whiteboard, pen, notebook etc.
- Flip chart
- Participant Handbook\ handouts
- LCD projector
- Attendance sheet

Explain

- 5S system
- Demonstrate advantages of 5S Implementation.

Activity

Activity Name	Topic Trivia
Objective	Trivia questions about topics related to job role is a fun team-building activity that allows employees to know different concepts in a fun way and helps in improving engagement and creating good bonding within class.
Material Required	Pen, Notebook
Time required for Activity	1 Hour

Steps of Activity	• Divide the class into three groups and give one topic to each group. • Ask each group to prepare a short presentation on the given topic and present it in front of the class. • **Topics of presentation:** 5S System. • Only one group will give a presentation at one time while the other two groups will watch the first group perform. • The trainer may ask participants from other groups to ask questions or queries to the presenting group. • The marks will be given at the end when all the presentations will be completed. • The criteria for evaluating a presentation can be – knowledge of the topic, number of the questions answered, coverage content of the topic presented, confidence during the presentation. • The trainer may ask participants to set the ground rules for the presentation and evaluate the criteria.
Inference	Topic trivia is a great way to enhance knowledge and allow each team member to know each other well throughout the activity. This improves team cohesion, communication, and fosters a friendly culture.

Notes for Facilitation

- Gather and organize the supplies and other items needed for all the activities scheduled for the day.
- Encourage participants to follow all the ground rules of the activity and maintain decorum.
- While the participants are doing the activity, go around and make sure they are doing it properly.
- Assess each participant's work and contributions.
- Provide help wherever the participants are unable to understand the question.
- Help identify opportunities and potential.
- Summarize the discussion or ask others to do so.

Summary

- **Repair maintenance** is the repair of an item that has failed or which is showing imminent signs of failure.

- Condition-based maintenance is carried out when an equipment item starts to show early signs of failure or when its performance becomes degraded.
- Reliability-centred maintenance (RCM) uses a risk-based approach to organizing maintenance activities. Those items that contribute the most to overall risk receive a higher maintenance priority than those that are considered to be less critical.
- JHA or job safety analysis should be done before a work permit is issued.
- When the work is complete all copies of the permit should be returned to the issuing point. Once all the work inspection is done, a work permit is closed.
- After a piece of equipment or piping that operates under pressure has been opened and then reassembled **("buttoned up")** it must be pressure tested before being put back into service.
- The tightness test is conducted after the item was opened or cleaning inspection, or after routine maintenance. The test ensures that the equipment is leak-free but it does not test the integrity of the vessel or piping itself.
- The strength or hydro test is used when the equipment has been modified, say by having some welding done on it, or when structural repairs have been made.
- Tightness test pressures should not exceed the equipment MAWP or system design pressure or the vessel's relief valve set pressure.
- The risk-based approach to inspection helps ensure that resources are allocated as effectively as possible.
- 5-S system is defined as a method of workplace organization based on five Japanese words; roughly translated as **"sort," "orderliness," "cleanliness," "standardize" and "sustain."**
- **SEIRI (sort)** means the necessary and unnecessary materials available in the workplace should be sorted and classified.
- **SEITON (orderliness)** means preparing the necessary items neatly and systematically so that they can easily be taken and returned to the original place after use.
- **SEISO (cleanliness)** is essential to create a clean and regular working and living environment.
- **SEIKETSU (standardize)** establish standards of the best practice in the workplace and ensures that the standards are compiled.
- **Shitsuke** is about maintaining the improvements done in previous steps. It is about self-discipline to maintain or sustain the changes.

Exercise

1. What are the 5 phases of 5S?

   Answer: c) Standardize, Sort, Sustain, Shine, Set-in-Order

2. What is the purpose of the 5S system in the workplace?

   Answer: d) All of the above

3. This is Distinguishing between necessary and unnecessary things, and getting rid of what you do not need.

   Answer: c) Sorting

4. This is Setting up standards for a neat, clean, workplace.

   Answer: a) Standardize

5. It is all about standardizing the company culture and workplace norms to ensure working environments remain clean, decluttered and lean.

   Answer: d) Orderliness

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/9VR_gJ1FAyk
Reliability Centred Maintenance | RCM Explained

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/lRFWeTRAcCU
Pipeline safety

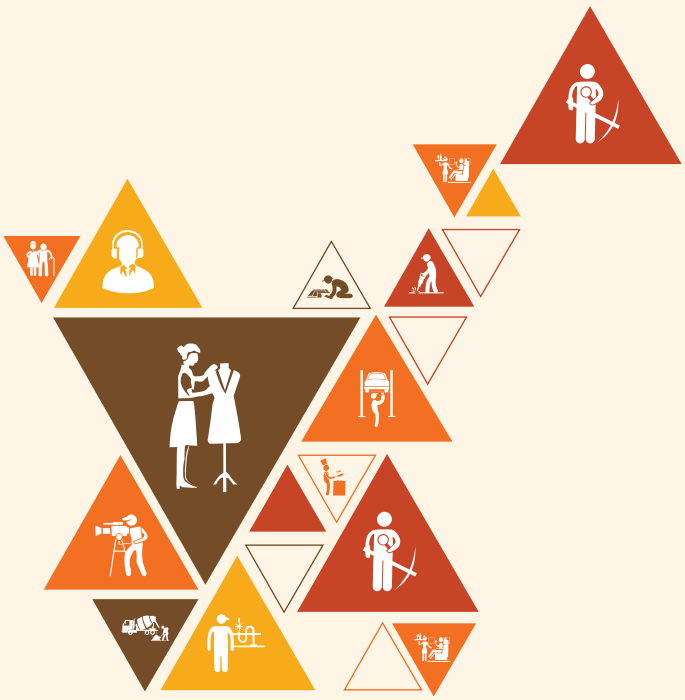
Scan the QR codes or click on the link to watch the related videos

https://youtu.be/CcbogALFNX0
What is 5s?

Notes

4 Working Effectively in a Team

Unit 4.1 - Working effectively in a team



HYC/N9301

Key Learning Outcomes

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

1. Discuss the communication skills.
2. Define the teamwork and communication in handling patient.

Unit 4.1: Working Effectively in a Team

Unit Objectives

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

1. Identify the importance of effective communication.
2. List out essential skills required for effective communication.
3. Identify barriers to effective communication.
4. Define how to work effectively in a team.

Resources to be used

- Whiteboard, pen, notebook etc.
- Flip chart
- Participant Handbook\ handouts
- LCD projector
- Attendance sheet

Do

- Greet and welcome the participants to the next session of the program.
- Before starting the session ask them if they have any doubts pertaining to the previous unit.
- Acknowledge their responses and clear their doubts if any.
- Tell them they are going to learn about Effective Communication and Teamwork.

Ask

- What is effective communication?
- How do you communicate with the supervisor?
- What is the importance of achieving goals in the workplace?

Discuss

- Discuss the characteristics of effective communication.
- Effective Communication Skills.
- Barriers to Effective Communication.
- Barriers Involving People's Background.
- five important aspects to remember when communicating with your supervisor.
- Achieve Goals in the Workplace.
- How to accomplish goals.
- Working Effectively in a Team.

Activity

Activity Name	Group Race
Objective	Builds trust and collaboration among team members. The nature of the game also focuses on developing communication and active listening.
Material Required	Pen, Notebook
Time required for Activity	1 Hour
Steps of Activity	• Divide the class into 4 or 6 groups of an equal number of participants and ask each group to choose their contender group (No team will select the same group). • Now each group will assign a topic to each of their choice (Limited to the chapter). • Once all the groups have their topics, each group will be asked to prepare any 5 important points related to that topic (Give 10-15 min time to each group for the task). • Now when all groups are prepared with their points they will share their points with the team who assigned them the topic. • Now this team will cross-check their points and grade them based on each point. (Grading will be done out of 5, if correct full points otherwise 0). • The checking team will also explain at the end why they have given zero, if given. • In the end, the team with maximum marks will be announced as the star team.

Inference	By the end, the team will realize how every team member's participation is essential to success. When they work together as a team, new strategies are developed to solve the problem at hand, and the confidence level of each other rises.

Notes for Facilitation

- Explain the learning objectives.
- Encourage and guide participants to think critically.
- Listen to the participants' comments, questions, and feedback.
- Help participants with observations and analysis.
- Help participants arrive at appropriate conclusions.
- Encourage participants to contribute to the discussion.
- Help participants reach an appropriate consensus.
- Help identify opportunities and potential.
- Summarize the discussion or ask others to do so.

Summary

- Effective communication is a process of exchanging ideas, thoughts, knowledge and information such that the purpose or intention is fulfilled in the best possible manner.
- **Listening and understanding is** the most crucial skill in a person he must be a good, alert and patient listener.
- Effective communication has certain characteristics such as clear, correct, precise, complete, and reliable messages.
- Non-verbal communication includes gestures, facial expressions, eye contact, postures, etc.
- Effective communication is always a two-way process and providing feedback is an essential part of it.
- Certain obstacles sometimes hinder the process of communication, language barriers, ambiguity, overuse of abstractions, and information overload.
- **Physiological Barriers are** the physical disability of the people involved. Some of these are hearing impairment, poor eyesight, stammering, etc.
- Goal setting gives direction and helps with time management.
- SMART goals are a methodology for setting goals that makes them easier to track and accomplish.
- Working effectively in a team can lead to more effective and innovative solutions in the workplace.

Exercise

1. The clear exchange of ideas and information is _____.

   Answer: b) Communication

2. The characteristics of communication when the sender must be sure from his end that whatever he is conveying is right by his knowledge is called _____.

   Answer: d) Sender's Courtesy

3. Which type of barriers to effective communication is the physical disability of the people to communicate effectively?

   Answer: a) Noise

4. SMART goals are a methodology for setting goals that makes them easier to track and accomplish. What does S stand for in SMART?

   Answer: b) Specific

5. _____ as a team is a great way to come up with a range of new and exciting ideas.

   Answer: c) Brainstorming

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/EDMY39JE1sY
5 steps to manage conflict between team members

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/9MO1aY1xC80
Motivation - leader and teamwork!

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/6fbE52YDEjU
Team work can make the dream work

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/H_vOfqIpD60
Why team building is important

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/WTa4wvFVX_Y
How to manage conflict in a team

Scan the QR codes or click on the link to watch the related videos

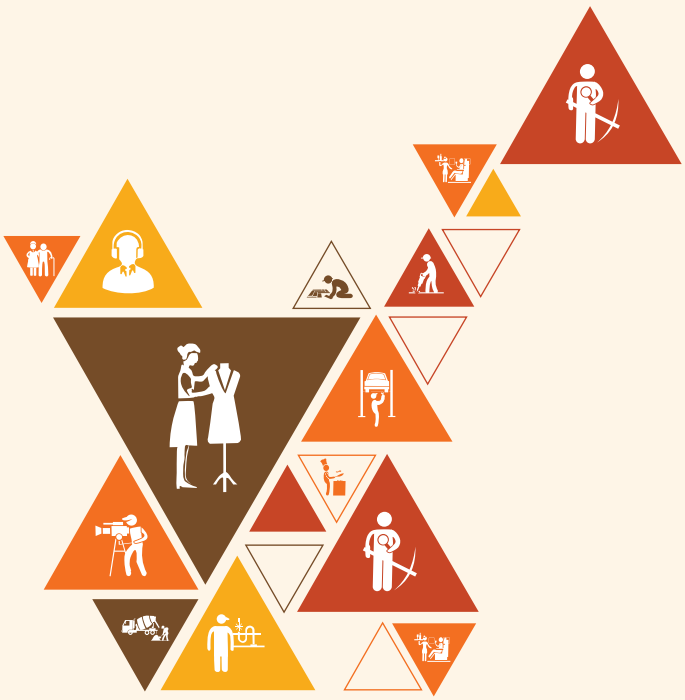
https://youtu.be/fUXdrl9ch_Q
Good Teamwork and Bad Teamwork

Notes

Notes

5 Maintain Health, Safety and Security Procedures

Unit 5.1 - Maintain a safe working environment



HYC/N9302

Key Learning Outcomes

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

1. Identify the importance of promoting a safe working environment.
2. Identify how to reduce risk.
3. Define hospital electrical safety measures.
4. Define hospital Pipeline Maintenance Technician measures.
5. Define hospital environment safety measures.
6. Explain medical emergencies.
7. Explain the procedure of dealing with a medical emergency.
8. Identify the basic fire awareness.
9. Explain the First Aid process.
10. Explain the Cardiopulmonary Resuscitation (CPR) process.

Unit 5.1: Maintain a Safe Working Environment

Unit Objectives

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

1. Identify the importance of promoting a safe working environment.
2. Identify how to reduce risk.
3. Define hospital electrical safety measures.
4. Define hospital Pipeline Maintenance Technician measures.
5. Define hospital environment safety measures.
6. Explain medical emergencies.
7. Explain the procedure of dealing with a medical emergency.
8. Identify the basic fire awareness.
9. Explain the First Aid process.
10. Explain the Cardiopulmonary Resuscitation (CPR) process.

Resources to be used

- Whiteboard, pen, notebook etc.
- Flip chart
- Participant Handbook\ handouts
- LCD projector
- Attendance sheet

Do

- Greet and welcome the participants to the next session of the program.
- Before starting the session ask them if they have any doubts pertaining to the previous unit.
- Acknowledge their responses and clear their doubts if any.
- Tell them they are going to learn about maintaining health and safety in an organization.

Ask

- How do you maintain health and safety at the workplace?
- What do you know about Pipeline Maintenance Technician measures?

- What do you understand by first-aid?
- How to Reduce Risk?
- Near misses.
- Accident/incident reporting.

Explain 

- Promotion of a Safe Working Environment.
- Hazards Related to the Oil and Gas Industry.
- Managing Occupational Safety and Health Risks.
- Risk Management Process.
- Personal Protective Equipment (PPE).
- Different types of safety signs.
- Medical Emergencies.
- Basic Fire Awareness.
- First Aid for burns, bleeding.
- Cardiopulmonary Resuscitation (CPR).

Activity 

Activity Name	The painting game
Objective	Recognize the Fire Safety
Material Required	Pen, Notebook, Fire extinguisher
Time required for Activity	1 Hour
Steps of Activity	• Paint a situation of Gas Leak, Outbreak of fire, electrical fire and toilet block. Nominate the individuals/team to take action. Others should observe and learn. • **Debriefing:** At the end of the class carry out the debriefing by revising the various health issues, emergencies and first aid/ how to address the emergencies.
Inference	The candidate will be able to perform the process of fire safety.

Activity

Activity Name	Chit game
Objective	Identify the common health issues.
Material Required	Pen, Notebook
Time required for Activity	1 Hour
Steps of Activity	• Prepare chits on common health issues like the common cold, flu/influenza, Cuts or scratches, diarrhoea, Nausea and vomiting, burns or scald, electric shock, fracture. • Distribute chits randomly. • Ask participants to speak on the issues (the answer will cover what it is or commonly called? What to do/how to deal and how to avoid. • Ask participants to present and others to identify gaps if any. • As a facilitator, fill in the gaps, where required.
Inference	The candidate will be able to perform the process of fire safety.

Notes for Facilitation

- Explain the learning objectives.
- Encourage and guide participants to think critically.
- Listen to the participants' comments, questions, and feedback.
- Help participants with observations and analysis.
- Help participants arrive at appropriate conclusions.
- Encourage participants to contribute to the discussion.
- Help participants reach an appropriate consensus.
- Help identify opportunities and potential.
- Summarize the discussion or ask others to do so.

Summary

- As defined by WHO, health is a "state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity''.

- Safety is the state of being 'safe', the condition of being protected from harm or other non-desirable outcomes.
- Workers in the oil and gas industry are generally susceptible to certain safety and injury hazards such as **motor vehicle accident, contact injuries, fire and explosions, slip, trips and falls etc.**
- Workers in the Oil and Gas industry are generally susceptible to chemical hazards, physical hazards, biological hazards, ergonomic hazards, and psychosocial hazards.
- It is important that the driver, and driveshaft, are secured from inadvertent movement before anyone works on the pump.
- It is important to ensure that the steam—and the associated steam condensate system—are properly isolated.
- A systematized approach PDCA should be used for managing occupational safety and health hazards
- Risk management includes identifying the risks, evaluating and prioritizing the risks, and implementing preventive/protective measures to control the risk.
- Job safety analysis is a process of systematically evaluating certain jobs, tasks, processes or procedures and eliminating or reducing the risks or hazards in order to protect workers from injury or illness.
- Personal protective equipment (PPE) is clothing or equipment worn by workers to protect them from various hazards.
- Fire extinguishers are designed to tackle specific types of fire.
- There are five different classes of fire, class A, B, C, D, E, K.
- There are different types of fire extinguishers, water extinguishers, dry chemical powder, foam-type extinguishers, carbon dioxide extinguishers, and special dry powder.
- The fire extinguishers are used by following the PASS technique.
- First aid is the first assistance or treatment given to a casualty or a sick person for any injury or sudden illness before the arrival of an ambulance.
- Cardiopulmonary resuscitation (CPR) is a lifesaving technique. It aims to keep blood and oxygen flowing through the body when a person's heart and breathing have stopped.

Exercise

1. A _____ examines the hazardous conditions at a workplace to identify risks and implement measures to prevent or reduce the risks.

   Answer: a) Risk assessment

2. These are the clothing or equipment worn by workers to protect them from fire, exposure to toxic chemicals and direct impact.

   Answer: b) Personal Protective Equipment (PPE)

3. The method of using a fire extinguisher is to follow P.A.S.S. PASS is the acronym for, Pull the Pin (P), Aim (A), Squeeze (S) and _____.

   Answer: b) Sweep

4. These are the type of burns which are very serious and require skin grafting.

   Answer: d) 4th degree burn

5. What does CPR stand for?

   Answer: c) Cardiopulmonary rescue

6. These are the signs which mean "You must not" or "Do not do. . .," or "Stop."

   Answer: a) Prohibition signs

7. This occurs with the failure of the circulatory system due to which insufficient oxygen reaches the tissues.

   Answer: b) Shock

8. These are the class of fire that are related to solid materials.

   Answer: d) Class A

9. Which of the following is strictly prohibited in fire emergency procedures?

   Answer: a) Apply the extinguisher medium to the base of the flames

10. In order to be a first aider one must remember PACT, what does P stand for in PACT?

    Answer: b) Protect

Notes

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/apwK7Y362qU
Know what to do during a fire

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/QEB7wE-YFXg
Personal protective equipment

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/2V2FFQUfxj0
Types of safety signs and symbols

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/xnZZruGjKBA
Classes of fire

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/aU1P7-Cn72s
Types of fire and fire extinguishers

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/3nakKzM66hk
Fire extinguishing agents

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/XmPnXzQVLQg
Clean agent fire suppression system

Scan the QR codes or click on the link to watch the related videos

https://youtu.be/9igRiyURobE
How to use a fire extinguisher

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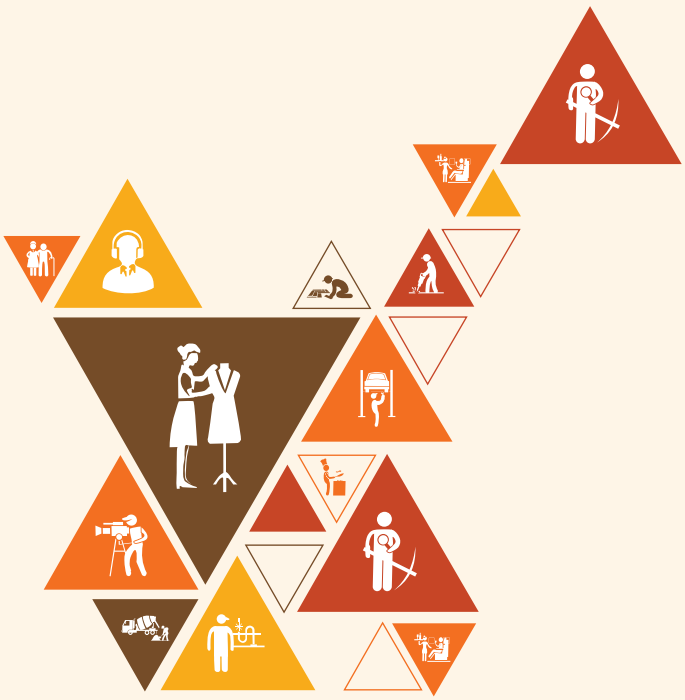
Skill India
कौशल भारत - कुशल भारत

सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

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

HSSC
HYDROCARBON SECTOR
SKILL COUNCIL

6. Employability Skills
60 Hours



DGT/VSQ/N0102

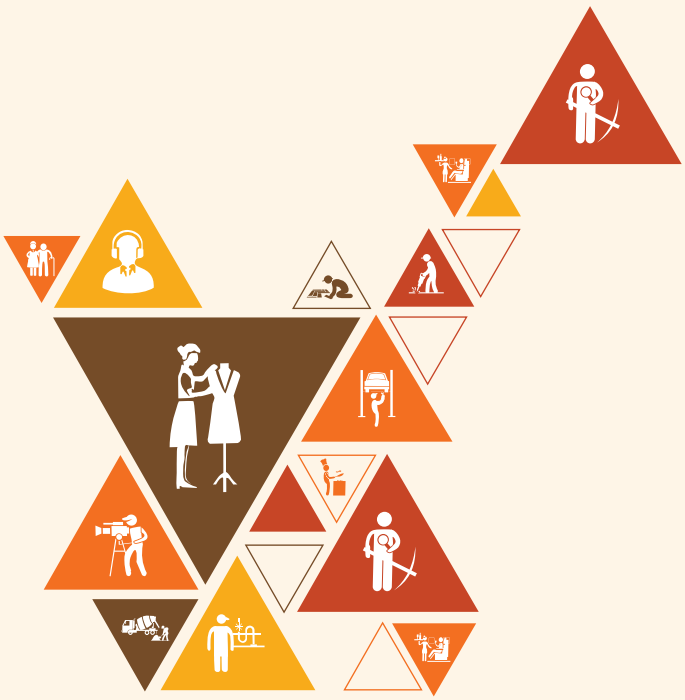
Scan the QR code or click on the link to watch related videos

Employability Skills (https://eskillindia.org/NewEmployability)

7. Annexure

Annexure I: Training Delivery Plan

Annexure II



Annexure I

Training Delivery Plan

Training Delivery Plan			
Program Name:	Pipeline Maintenance Technician (Mechanical)		
Qualification Pack Name & Ref. ID	HYC/Q6402		
Version No.	1.0	**Version Update Date**	04-03-2020
Pre-requisites to Training (if any)	Class XII / ITI (two years after class 10th)		
Training Outcomes	**After completing this programme, participants will be able to:** • Check the equipment and machines installed in oil and gas pipeline facility to identify the defect/damage and plan for the repair and maintenance of the identified defect • Carry out installation, repair, maintenance and testing of equipment in oil & gas pipeline • Follow safety procedure during emergency/accident • Work effectively with colleagues, superiors, members of own work group, people in other work groups within or outside the organization		

S. No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools/Aids	Duration (hours)
1	Introduction to Hydrocarbon Sector	• Icebreaker • Objective of the Program	• Build rapport with fellow participants of the program • State the Objectives of the Program.	N/ A	Icebreaking Activities, Discussions, Interaction, Lectures.	PPT Slides and handouts	T: 08:00 P: 00:00
2	Introduction to Hydrocarbon Sector	Hydrocarbon Sector in India Job Role of a Pipeline Maintenance Technician (mechanical)	• Describe about the hydrocarbon sector in India • List the three major segments in the hydrocarbon sector. • Identify about the achievements of hydrocarbon sector. • Identify and perform about the roles and responsibilities of fire safety technician. • Define and conduct OISD standards for fire-fighting equipment and appliances in oil and gas industry. • State about the essential skills of fire safety technician. • Demonstrate the career aspects of fire safety. • Identify roles and responsibilities of fire safety technician. • Identify essential skills and knowledge required by fire safety technician.	N/ A	Discussions, Interaction, Lectures.	PPT, Projector & Screen, Participant Handbook, Audio Visual, Chart Paper, Board Marker, Pens, Pencils, etc.	T: 08:00 P: 00:00

S. No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools/Aids	Duration (hours)
3	Prepare for repair and maintenance activities of the equipment	Introduction to Crude Oil	• Identify the oil and gas pipeline equipment that are meeting its safety and technical standards.	HYC/N6402 PC1 -PC10 KU1 – KU14 GS1 – GS21	Discussions, Interaction, Lectures.	• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit	T: 08:00 P: 22:00
4	Prepare for repair and maintenance activities of the equipment	Introduction to Crude Oil	• Examine the identified defect/damage in equipment/machine. • Follow the maintenance manual of the machine and equipment requiring maintenance or repair.	HYC/N6402 PC1 -PC10 KU1 – KU14 GS1 – GS21	Discussions, Interaction, Lectures.	• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit	T: 08:00 P: 22:00

S. No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools/Aids	Duration (hours)
5	Prepare for repair and maintenance activities of the equipment	Equipment and Machines	• Identify what work permit is and how to obtain the work permit from concerned department/authority.	HYC/N6402 PC1 -PC10 KU1 – KU14 GS1 – GS21	Discussions, Interaction, Lectures.	• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit	T: 08:00 P: 22:00
6	Prepare for repair and maintenance activities of the equipment	Equipment and Machines	• Identify the different types of equipment and machines used and are meeting its safety and technical standards.	HYC/N6402 PC1 -PC10 KU1 – KU14 GS1 – GS21	Discussions, Interaction, Lectures.	• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit	T: 08:00 P: 22:00

S. No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools/Aids	Duration (hours)
7	Prepare for repair and maintenance activities of the equipment	Equipment and Machines	• Examine the identified defect/damage in equipment/machine.	HYC/N6402 PC1 -PC10 KU1 – KU14 GS1 – GS	Discussions, Interaction, Lectures.	• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit	T: 08:00 P: 24:00
8	Carryout repair, maintenance and testing of equipment in oil and gas pipeine	Carry out repair and preventive maintenance	• Carry out repair and preventive maintenance.	HYC/N6403 PC1 -PC16 KU1 – KU16 GS1 –GS20	Discussions, Interaction, Lectures.	• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit	T: 08:00 P: 17:00

S. No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools/Aids	Duration (hours)
9	Carryout repair, maintenance and testing of equipment in oil and gas pipeline0	Carry out repair and preventive maintenance	• Carry out repair and preventive maintenance.	HYC/N6403 PC1 -PC16 KU1 – KU16 GS1 – GS20	Discussions, Interaction, Lectures.	• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit	T: 08:00 P: 17:00
10	Carryout repair maintenance and testing of equipment in oil and gas pipeline	Carry out repair and preventive maintenance	• Perform 5S activities post repair and maintenance.	HYC/N6403 PC1 -PC16 KU1 – KU16 GS1 – GS20	Discussions, Interaction, Lectures.	• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit	T: 08:00 P: 17:00

S. No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools/Aids	Duration (hours)
11	Carryout repair, maintenance and testing of equipment in oil and gas pipeline	Carry out repair and preventive maintenance	• Perform 5S activities post repair and maintenance.	HYC/N6403 PC1 - PC16 KU1 - KU16 GS1 - GS20	Discussions, Interaction, Lectures.	• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit	T: 08:00 P: 17:00
12	Carryout repair, maintenance and testing of equipment in oil and gas pipeline	Carry out repair and preventive maintenance	• Prepare the repair and maintenance report and submit it to the supervisor.	HYC/N6403 PC1 - PC16 KU1 - KU16 GS1 - GS20	Discussions, Interaction, Lectures.	• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit	T: 08:00 P: 17:00

S. No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools/Aids	Duration (hours)
14	Carryout repair, maintenance and testing of equipment in oil and gas pipeline	Testing of equipment & machine after repair	• Identify the 5S and advantages of implementing the 5S.	HYC/N6403 PC1 -PC16 KU1 – KU16 GS1 – GS20	Discussions, Interaction, Lectures.	• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit	T: 08:00 P: 17:00
14	Carryout repair, maintenance and testing of equipment in oil and gas pipeline	Testing of equipment & machine after repair	• Identify the 5S and advantages of implementing the 5S.	HYC/N6403 PC1 -PC16 KU1 – KU16 GS1 – GS20	Discussions, Interaction, Lectures.	• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit	T: 08:00 P: 17:00

S. No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools/Aids	Duration (hours)
15	Carryout repair, maintenance and testing of equipment in oil and gas pipeline	Testing of equipment & machine after repair	• Identify the 5S and advantages of implementing the 5S.	HYC/N6403 PC1 -PC16 KU1 – KU16 GS1 – GS20	Discussions, Interaction, Lectures.	• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit	T: 08:00 P: 17:00
16	Carryout repair, maintenance and testing of equipment in oil and gas pipeline	Testing of equipment & machine after repair	• Identify the 5S and advantages of implementing the 5S.	HYC/N6403 PC1 -PC16 KU1 – KU16 GS1 – GS20	Discussions, Interaction, Lectures.	• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit	T: 08:00 P: 17:00

S. No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools/Aids	Duration (hours)
17	Carryout repair, maintenance and testing of equipment in oil and gas pipeline	Testing of equipment & machine after repair	• Identify the 5S and advantages of implementing the 5S.	HYC/N6403 PC1 -PC16 KU1 – KU16 GS1 – GS20	Discussions, Interaction, Lectures.	• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit	T: 08:00 P: 17:00
18	Carryout repair, maintenance and testing of equipment in oil and gas pipeline	Testing of equipment & machine after repair	• Identify the 5S and advantages of implementing the 5S.	HYC/N6403 PC1 -PC16 KU1 – KU16 GS1 – GS20	Discussions, Interaction, Lectures.	• Snips and shears • Hacksaws • Chisels • Grades and files • Open-end wrenches • Spanner • Allen key • Vernier calliper • Micrometre • Adjustable wrenches • Pliers • Hammers • Punches • Taps and dies • Drills • Grinders • Screw driver • Spirit level • Anvil • Leak detector • Motor • Pumps • Drilling machine – Bench • Grinding machine – Bench • Bearing puller • Machine/ equipment manuals • Twist drill bit	T: 08:00 P: 14:00
19	Work effectively in a team	Work effectively in a team	• Identify importance of effective communication. • List out essential skills required for effective communication.	HYC/N9301 PC1 – PC9 KU1 –KU8 GS1 – GS7	Discussions, Interaction, Lectures.	Communication equipment like mobile and walkie talkie	T: 08:00 P: 14:00
20	Work effectively in a team	Work effectively in a team	• Identify barriers to effective communication.	HYC/N9301 PC1 – PC9 KU1 –KU8 GS1 – GS7	Discussions, Interaction, Lectures.	Communication equipment like mobile and walkie talkie	T: 08:00 P: 14:00
21	Work effectively in a team	Work effectively in a team	• Define how to work effectively in team.	HYC/N9301 PC1 – PC9 KU1 –KU8 GS1 – GS7	Discussions, Interaction, Lectures.	Communication equipment like mobile and walkie talkie	T: 08:00 P: 12:00

S. No.	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools/Aids	Duration (hours)
22	Maintain health, safety and security procedures	Maintain a Safe Working Environment	• Identify the importance of promoting a safe working environment • Identify how to reduce risk	HYC/N3602 PC1 – PC18 KU1 – KU11 GS1 – GS8	Discussions, Interaction, Lectures.	• Personal protective equipment • Gloves • Goggles • First aid kit • Safety belts and straps • Safety shoes • Sample health and safety SOP • Housekeeping kit • Fire extinguisher and fire-fighting equipment • First aid kit • Safety sign board • Sample rescue procedure (SOP)	T: 08:00 P: 16:00
23	Maintain health, safety and security procedures	Maintain a Safe Working Environment	• Define hospital electrical safety measures • Define hospital fire safety measures	HYC/N3602 PC1 – PC18 KU1 – KU11 GS1 – GS8	Discussions, Interaction, Lectures.	• Personal protective equipment • Gloves • Goggles • First aid kit • Safety belts and straps • Safety shoes • Sample health and safety SOP • Housekeeping kit • Fire extinguisher and fire-fighting equipment • First aid kit • Safety sign board • Sample rescue procedure (SOP)	T: 08:00 P: 16:00
24	Maintain health, safety and security procedures	Maintain a Safe Working Environment	• Define hospital environment safety measures • Explain medical emergencies • Explain the procedure of dealing with medical emergency	HYC/N3602 PC1 – PC18 KU1 – KU11 GS1 – GS8	Discussions, Interaction, Lectures.	• Personal protective equipment • Gloves • Goggles • First aid kit • Safety belts and straps • Safety shoes • Sample health and safety SOP • Housekeeping kit • Fire extinguisher and fire-fighting equipment • First aid kit • Safety sign board • Sample rescue procedure (SOP)	T: 08:00 P: 16:00
25	Maintain health, safety and security procedures	Maintain a Safe Working Environment	• Identify the basic fire awareness • Explain the First Aid process • Explain the Cardiopulmonary Resuscitation (CPR) process	HYC/N3602 PC1 – PC18 KU1 – KU11 GS1 – GS8	Discussions, Interaction, Lectures.	• Personal protective equipment • Gloves • Goggles • First aid kit • Safety belts and straps • Safety shoes • Sample health and safety SOP • Housekeeping kit • Fire extinguisher and fire-fighting equipment • First aid kit • Safety sign board • Sample rescue procedure (SOP)	T: 08:00 P: 16:00
						Total Duration	**350**

Annexure II

Sl No.	Module No.	Unit No. and Name	Topic Name	Page No.	URL	QR Code (s)
1	Module 1	Unit 1.1 - Introduction to hydrocarbon sector	1.2.1 What does a pipeline maintenance technician do?	8	https://youtu.be/W-PooTpdcyw	The People Behind The Pipeline
2	Module 2	Unit 2.1 - Introduction to crude oil	2.1.1 What Is Crude Oil?	18	https://youtu.be/6ozmKhahk8M	Fundamentals of upstream, midstream, and downstream
3	Module 2	Unit 2.1 - Introduction to crude oil	2.1.1 The process of crude oil refining	18	https://youtu.be/cXnHOOTCrKY	Crude-oil distillation in a refinery
4	Module 2	Unit 2.1 - Introduction to crude oil	2.1.2 Natural Gas Processing	18	https://youtu.be/QgtSoEJD9HE	Turning natrual gas into liquid

Sl No.	Module No.	Unit No. and Name	Topic Name	Page No.	URL	QR Code (s)
5	Module 2	Unit 2.1 - Introduction to crude oil	2.1.2 Natural Gas Processing	18	https://youtu.be/PenuYdMm3Wg	Natural Gas 101: Natural Gas Transportation
6	Module 2	Unit 2.1 - Introduction to crude oil	2.1.3 Pipelines	19	https://youtu.be/Gap_IhBIrGI	How are pipelines constructed?
7	Module 2	Unit 2.2 - Equipment and machines	2.2.1 Work Permit System	19	https://youtu.be/_aNY6mV6ggE	Work permit system | Types of work permit | validity of work permit
8	Module 2	Unit 2.2 - Equipment and machines	2.2.23 Repair Techniques	19	https://youtu.be/-On1mpWlHpk	Pipeline leak repair clamps

Sl No.	Module No.	Unit No. and Name	Topic Name	Page No.	URL	QR Code (s)
9	Module 3	Unit 3.1 - Carry out repair and preventive maintenance	3.1 Repair and Preventive Maintenance	29	https://youtu.be/9VR_gJ1FAyk	Reliability Centred Maintenance | RCM Explained
10	Module 3	Unit 3.1 - Carry out repair and preventive maintenance	3.1.3 Pressure Tests	29	https://youtu.be/lRFWeTRAcCU	Pipeline safety
11	Module 3	Unit 3.2 - Testing of equipment & machine after repair	3.2.1 What is 5s?	29	https://youtu.be/CcbogALFNX0	Toyota Material Handling | Why 5s
12	Module 4	Unit 4.1 - Working effectively in a team	4.1.1 Effective Communication	36	https://youtu.be/EDMY39JE1sY	5 steps to manage conflict between team members

Sl No.	Module No.	Unit No. and Name	Topic Name	Page No.	URL	QR Code (s)
13	Module 4	Unit 4.1 - Working effectively in a team	4.1.1 Achieve Goals in the Workplace	36	https://youtu.be/9MO1aY1xC80	Motivation - leader and teamwork!
14	Module 4	Unit 4.1 - Working effectively in a team	4.1.4 Working Effectively in a Team	36	https://youtu.be/6fbE52YDEjU	Team work can make the dream work
15	Module 4	Unit 4.1 - Working effectively in a team	4.1.4 Work Effectively in a Team	36	https://youtu.be/H_vOfqIpD60	Why team building is important
16	Module 4	Unit 4.1 - Working effectively in a team	4.1.6 Work Effectively in a Team	37	https://youtu.be/WTa4wvFVX_Y	How to manage conflict in a team
17	Module 4	Unit 4.1 - Working effectively in a team	4.1.6 Work Effectively in a Team	37	https://youtu.be/fUXdrl9ch_Q	Good Teamwork and Bad Teamwork

Sl No.	Module No.	Unit No. and Name	Topic Name	Page No.	URL	QR Code (s)
18	Module 5	Unit 5.1 - Maintain a safe working environment	5.1.9 Rescue techniques applied during a fire hazard	46	https://youtu.be/apwK7Y362qU	Know what to do during a fire
19	Module 5	Unit 5.1 - Maintain a safe working environment	5.1.9 Use of personal protective equipments	46	https://youtu.be/QEB7wE-YFXg	Personal protective equipment
20	Module 5	Unit 5.1 - Maintain a safe working environment	5.1.10 Various types of safety signs and what they mean	46	https://youtu.be/2V2FFQUfxj0	Types of safety signs and symbols
21	Module 5	Unit 5.1 - Maintain a safe working environment	5.1.12 Types of fire	46	https://youtu.be/xnZZruGjKBA	Classes of fire
22	Module 5	Unit 5.1 - Maintain a safe working environment	5.1.12 Techniques of using the different fire extinguishers	46	https://youtu.be/aU1P7-Cn72s	Types of fire and fire extinguishers

Sl No.	Module No.	Unit No. and Name	Topic Name	Page No.	URL	QR Code (s)
23	Module 5	Unit 5.1 - Maintain a safe working environment	5.1.12 Techniques of using the different fire extinguishers	46	https://youtu.be/3nakKzM66hk	Fire extinguishing agents
24	Module 5	Unit 5.1 - Maintain a safe working environment	5.1.12 Techniques of using the different fire extinguishers	46	https://youtu.be/XmPnXzQVLQg	Clean agent fire suppression system
25	Module 5	Unit 5.1 - Maintain a safe working environment	5.1.12 Different methods of extinguishing fire	46	https://youtu.be/9igRiyURobE	How to use a fire extinguisher

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