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GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP



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National
Skill Development
Corporation

Transforming the skill landscape



Facilitator Guide



Sector
Mining

Sub-Sector
Engineering Services

Occupation
Field Services – Mechanical

Reference ID: MIN/Q 0433, Version 1.0
NSQF Level 4

HEMM Mechanic

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Shri Narendra Modi

Prime Minister of India

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



Acknowledgements

SCMS has become operational since January, 2014 with a mandate to support the mining sector through a range of skill development initiatives that includes development of National Occupational Standards and Qualification Packs (NOS/QP) in line with National Skill Qualification Framework (NSQF) with reference to the sectorial job roles to begin with and thereafter to roll out the skill development programs in partnership with accredited Training Providers leading to assessment and certification by SCMS, the objective thus being to ensure adequate availability of skill trained and certified workforce through sound system and process of training, assessment and certification.

The key factors affecting the human resources and skill requirement in the Indian Mining Industry are technology up-gradation, increase in productivity stringent environment and sustainable development framework, globalization and aging profile of workforce and long gestation period for skill acquisition.

Considering the specialization & complexity of job roles in mining sector, a systematic and analytical approach was required for development of the contents corresponding to specified QP/NOS in line with the guidelines of NSQF. Accordingly taking benefit of the available in house competency along with the support of domain experts, SCMS has developed this “**Facilitator Guide**” for **HEMM Mechanic**

I am sanguine that this handbook will lead to successful roll out the skill development initiatives in this area, helping greatly our stakeholders particularly trainees, trainers and assessors etc.

I, gratefully acknowledge support and contribution received from various mining companies in compiling this Handbook without which this would not have been possible.

Further, I wish to place on record our appreciation for the contribution made by entire team of SCMS and the support extended by NSDC team.

It is expected that this publication would meet the complete requirements of QP/NOS based training delivery of **HEMM Mechanic** job role, I would indeed welcome suggestions from users, mining companies, experts and other stakeholders for any improvement in future.

17th May 2016
New Delhi

(A.K. Bhandari)
Chief Executive Officer

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. The symbols used in this book are described below.

Symbols Used



Steps



Time



Tips



Notes



Objectives



Do



Ask



Explain



Elaborate



Field Visit



Practical



Lab



Demonstration



Exercise



Team Activity



Facilitation Notes



Learning Outcomes



Say



Resources



Activity



Summary



Role Play



Example

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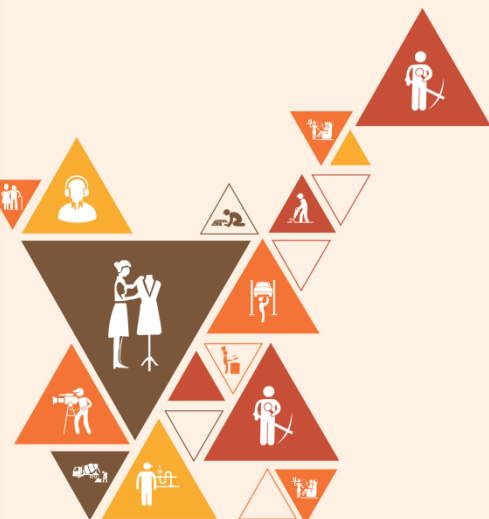
1. Introduction

Icebreaker

Unit 1.1 - What Does An HEMM Mechanic Do?

Unit 1.2 - Difference Between Underground & Opencast Mines

Unit 1.3 - Machinery Used In Opencast Mines & Underground Mines



MIN/N 0309

Key Learning Outcomes



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

1. Execute Installation and preventive maintenance activities on HEMM,
2. Install Machines
3. Perform preventive maintenance on HEMM and other vehicles
4. Track and log preventive maintenance activities
5. Execute Installation and preventive maintenance activities on light vehicles and other machine assemblies.

Icebreaker

Unit Objectives



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

1. Introduce each other
2. Build rapport with fellow students and the trainer
3. Find the interest of students

Resources to be used



- Available objects such as a duster, pen, notebook etc.
- A small bag to be used as parcel

Do



- Make the students stand in a circle, close enough to the person each side of them that they can pass the parcel quickly.
- Say 'Stop' when the when students least expect it. The person who has the parcel at that time should get out.
- Those who get out should introduce themselves by providing their names and a little additional information such as favorite hobbies, likes, dislikes etc.
- The winner of the game should stand and introduce himself/herself at the end of the game.

Say



- Thank the students for their participation.

Notes for Facilitation



- You could ask the students who get out during the game to be the music keepers. They can start and stop the music as the game progresses.
- Encourage shy students to provide information about themselves by prompting them with questions such as 'what do you enjoy doing the most', 'what is your favorite movie or book' etc.

UNIT 1.1: Introduction

Unit Objectives



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

1. Execute Installation and preventive maintenance activities on HEMM,
2. Install Machines
3. Perform preventive maintenance on HEMM and other vehicles
4. Track and log preventive maintenance activities
5. Execute Installation and preventive maintenance activities on light vehicles and other machine assemblies.

Say



- An HEMM Mechanic performs maintenance and repair activities on various pieces of heavy earth moving machines including but not limited to heavy duty truck and semi-tractors, material spreader, 6- wheel drive military type vehicles.
- Keeps: tools, equipment, and work area clean, organized, and in good working condition.
- An HEMM mechanic also diagnoses, services and repairs various systems of HEMM.
- Maintains regular checks and adjustments on things such as fluid levels, hoses, belts, brakes, tires, and clutches; changes filters and oil, and lubricates vehicles and motor driven equipment

Explain



- Explain the work profile of HEMM mechanic.
- Explain the general work performed by a HEMM mechanic.

Notes for Facilitation



- You could ask the students if they knew a HEMM mechanic.
- If anyone of the student says yes then ask the work profile and place of work of HEMM mechanic.

UNIT 1.2: Difference between Underground and Opencast Mine

Say



- Underground mining is the type of mining in which mining process is done in underground
- Underground mining is the process of extracting minerals and ores that are buried too far underground to be mined using surface mining methods.
- Shaft mining is the type of mining which is conducted vertically underground.
- Longwall mining is a more modern method of underground to extract coal from a coal bed.
- Borehole mining is a remote-controlled method of underground mining used to mine a broad range of natural resources and industrial materials.

Explain



- Explain the difference between various findings of mines like what is ore ? what is rock?, what are the minerals?, and so on.
- Explain the major types of mining viz. Surface mining and Underground mining.
- Explain various phases in which mining is done like explain the process of site exploration, site development and so on.
- Explain some key mining terms used in the industry

Notes for Facilitation



- You could ask the students that how many type of mining they know.
- Give students some time to think about the types of mining.
- Ask the students if they know about rock and coal mining.
- Discuss the difference between underground and Opencast Mining.
- Ask the students if they know what ores is and why it is used
- Set the context and describe the mining methods used in industry.
- Show some minerals, ores, and rock samples produced by mining.

Ask



- Ask the students about the activities performed in surface and underground mining.

UNIT 1.3: Machinery Used in Opencast Mines & Underground Mines

Explain



- Explain the types of machines being used in mining industries.
- Explain the major functional area of each machine.

Notes for Facilitation



- Brief students about machineries required in mining and why hand work is kept minimal in mines.
- One by one call names of machines and ask the student about their functions.
- You can also make it a small quiz competition if there are less students in the batch.
- If possible, show different mining equipment and machines to the students.

Ask



- Ask the students to make a pencil chart having name of machines and functions that they can perform. Allow them to work in group if they want to.





2. Diagnose HEMM for repair requirements

Unit 2.1 - Introduction

Unit 2.2 - Machine Identification Plate

Unit 2.3 - Typical Vehicle Identification Number (Vin)

Unit 2.4 - Typical Engine Identification Number

Unit 2.5 - Torque Settings

Key Learning Outcomes



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

1. Explain the importance of machine identification number
2. Define various engine parts
3. Define hydraulic parts
4. Describe maintenance process and procedures
5. Describe various service tools required during maintenance and repair
6. Execute troubleshooting on vehicles and other machine assemblies.

UNIT 2.1: Introduction

Unit Objectives



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

1. Types of earth moving equipment
2. Inspection, repair and maintenance of earth moving equipment
3. Basic Machinery defect diagnostic
4. Basic safety measures to be adopted for machine maintenance use of machine tool
5. Knowledge and understanding of
6. An individual to assist in diagnosing faults and troubleshooting problems in a Heavy Earth
7. Moving Machine (HEMM)
8. Identify and diagnose operational faults
9. Use diagnostic procedures as defined in the troubleshooting checklist prepared by the equipment manufacturer
10. Use diagnostic tools as required to assess the problem, this includes using on board diagnostic computer to attain vehicle data and compare the same with standard output to detect faults in the system.
11. The basic technology used in and functioning of various components and aggregates of the vehicle.
12. The tools used to assess and confirm technical faults that cannot be determined through a visual inspection

Notes for Facilitation



- Ask the students if they have diagnosed a vehicle or HEMM for any repair work.
- If yes, then ask the malfunction part of the vehicle and what procedure they have opted to change or repair the particular part.

UNIT 2.2: Machine Identification Plate

Say



- Every HEMM has an identification plate mounted on the loader tower. The serial numbers of the machine and its major units are stamped on the plate.
- The machine and engine serial numbers can help identify exactly the type of equipment you have.

Notes for Facilitation



- Show the machine identification plate to the students and discuss the information written on plate.

Ask



- Ask the students about the importance of Machine identification plate.

UNIT 2.3: Typical Vehicle Identification Number

Say



- Vehicle identification number is used to identify the vehicle in case of lost or theft.
- Vehicle identification number is also used to recognize the vehicle in harsh condition.

Notes for Facilitation



- Discuss typical vehicle identification number (VIN) to students and explain the purpose and details of this number.

Ask



- Ask the students about the need of vehicle identification number.

UNIT 2.4: Typical Engine Identification Number

Say



- The engine identification number is used to identify the vehicle on the basis of engine number.
- The engine identification number is generally consists of 5 major codes which consists of Engine Type, Build Number, Country of Origin, Engine Sequence Number, and Year of Manufacturing of vehicle.

Notes for Facilitation



- Discuss about the typical engine identification number of a machine and explain the details and purpose of this number.

Ask



- Ask the students about the need of engine identification number on a vehicle.

UNIT 2.5: Torque Settings

Say



- Use this torque setting where no torque setting is specified in the text.
- For lubricated threads the values should be reduced by one third.

Notes for Facilitation



- Discuss the procedure of torque settings with the students.

Ask



- Ask the students about the need of torque settings if it is not given by manufacturer.

Explain



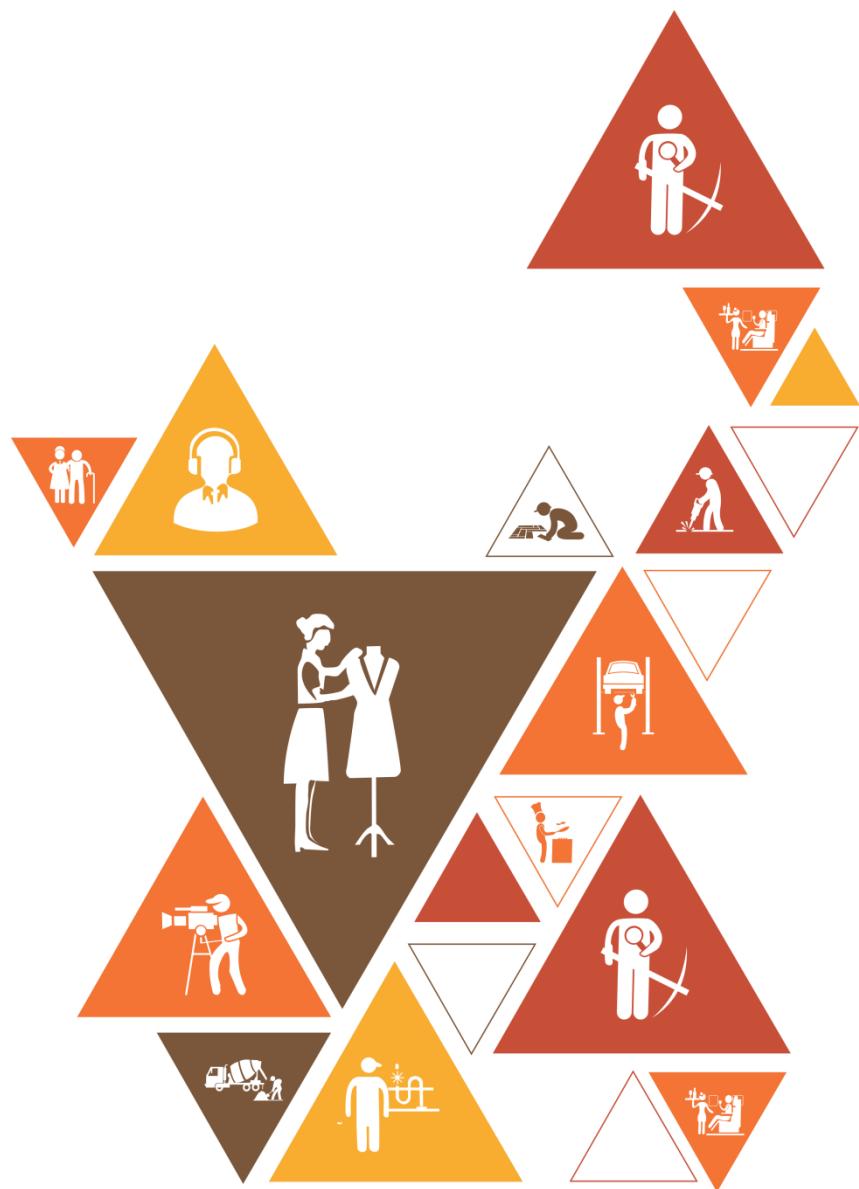
- Explain the procedure of applying torque settings.

UNIT 2.6: Service Tools

Notes for Facilitation



- Show some service tools to the students.
- Explain the working of some important service tools.





3. Carry out service, repair and maintenance

Unit 3.1 - HYGIENE
Unit 3.2 - STORAGE
Unit 3.3 - LOADER ARM SAFETY STRUT
Unit 3.4 - CLEANING THE MACHINE
Unit 3.5 - ENGINE PANELS
Unit 3.6 - SEAT BELT
Unit 3.7 - GREASING
Unit 3.8 - TYRES AND WHEELS
Unit 3.9 - PARKING BRAKE
ADJUSTMENT
Unit 3.10 - CHECKING THE FOOT BRAKE
FLUID LEVEL
Unit 3.11 - ENGINE AIR FILTER
Unit 3.12 - ENGINE OIL AND FILTER
Unit 3.13 - ENGINE COOLING SYSTEM
Unit 3.14 - ADJUSTING THE FAN BELT

Unit 3.15 - CLEANING THE CAB HEATER
FILTER
Unit 3.16 FUEL SYSTEM
Unit 3.17 CHANGING THE FILTER ELEMENT
Unit 3.18 SYNCHRO SHUTTLE GEARBOX
Unit 3.19 POWERSHIFT GEARBOX
Unit 3.20 HYDRAULIC SYSTEM
Unit 3.21 CHANGING THE FILTER ELEMENT
Unit 3.22 CHANGING THE SUCTION
STRAINER
Unit 3.23 FRONT AND REAR AXLE
Unit 3.24 CHECKING THE OIL LEVEL
Unit 3.25 BATTERY
Unit 3.26 HYDRAULIC OIL COOLER
Unit 3.27 STABILISER LEGS (SIDESHIFT
MACHINES ONLY)
Unit 3.28 AIR CONDITIONING (IF FITTED)
Unit 3.29 HOSE BURST PROTECTION VALVE
(IF FITTED)

Key Learning Outcomes



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

1. Perform HEMM maintenance operation for activities that need to be carried out during a shift
2. Ensure OEM recommended procedure and checklist is followed for routine servicing
3. Calibrate, align and adjust settings, alignment, pressures, tension, speeds and levels relevant to:
 - a. Engine and aggregates
 - b. Transmission system
 - c. Load bearing arms and structure
 - d. Safety devices and components installed
 - e. Electrical and electronic components
 - f. Other components (including to valves, ignition, fuel and emissions, brakes, transmission, lights, tires, steering and body fittings)
4. Identify typical causes and symptoms of operational faults and failures of a vehicle corrective action to be taken for common engine and aggregate system faults and failures.

UNIT 3.1: Carry out service, repair and maintenance

Unit Objectives



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

1. Understanding the health risk of Lubricant as per hygiene.
2. Use special care while handling used oil.

Notes for Facilitation



- Ask the students if they have known the purpose of hygiene.
- What precautions should be used to handle used and harmful lubricant.

Say



- Excessive or prolonged skin contact can remove the natural fats from your skin which can cause dryness and irritation.
- Whenever you are handling oil products you should maintain good standards of care and personal and plant hygiene.

Ask



- Ask the students about the need of hygiene in everyday life.

UNIT 3.2: Storage

Unit Objectives



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

1. Proper storage of lubricant.
2. Disposal of waste.
3. Handling of new and used oil.

Notes for Facilitation



- Explain the storage process of harmful waste and used oil.
- Explain the process of first aid, in case of eye contact with oil or any harmful material.
- Explain the major aspects of machines maintenance in the daily jobs.

Say



- All waste products should be disposed of in accordance with all the relevant regulations.
- There are no special precautions needed for the handling or use of new oil, beside the normal care and hygiene practices.
- In the case of eye contact, flush with water for 15 minutes. If irritation persists, get medical attention.
- Firefighters should use self-contained breathing apparatus. A badly maintained machine is a danger to the operator and the people working around him.
- Maintenance must be done by suitably qualified personnel. Before attempting any maintenance work, make sure the machine is safe.

Ask



- Ask the students about the need of storage of materials used in machine.

UNIT 3.3: Loader Arm Safety Strut

Unit Objectives



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

1. Installation of Loader arm Strut.
2. Understand the warning which comes while installing loader arm strut.

Notes for Facilitation



- Explain the procedure of installing the loader arm strut.

Say



- Raised loader arms can drop suddenly and cause serious injury. Before working under raised loader arms, fit the loader arm safety strut..
- You could be killed or injured if the loader control is accidentally operated. Make sure no-one comes near the machine while you release the safety strut.
- Start the engine and slowly lower the loader arms onto the safety strut, stop the movement immediately the weight of the loader arms is supported by the safety strut.
- Inspect steelwork for damage. Note damaged paintwork for future repair.
- Make sure all pivot pins are correctly in place and secured by their locking devices.

Ask



- Ask the students if they have installed the loader arm strut earlier. If yes, ask the procedure.

UNIT 3.4: Cleaning the machine

Unit Objectives

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

1. Understand the process involve in cleaning the machine.
2. Preparing the machine for better cleaning.

Notes for Facilitation

- Explain the procedure of parking a machine for cleaning,
- Discuss the process of cleaning machine.

Say

- Park the machine on firm level ground, engage the parking brake and set the transmission to neutral.
- Lower the attachments to the ground and stop the engine. Clean the machine using water and/or steam.
- Airborne particles of light combustible material such as straw, grass, wood shavings, etc. must not be allowed to accumulate within the engine compartment or in the propshaft guards (when fitted).
- The machine must always be greased after pressure washing or steam cleaning. Always adhere to local regulations regarding the disposal of debris created from machine cleaning.

Ask

- Ask the students if they have cleaned their vehicle or machine. If yes then ask the procedure of cleaning.

UNIT 3.5: Engine Panels

Unit Objectives



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

1. Understand the opening and closing of bonnet.
2. Understand the process involve in removing and fitting a side panel.

Notes for Facilitation



- Explain the procedure of opening and closing of bonnet.
- Discuss the procedure of removing and fitting a side panel.

Say



- To release the bonnet, pull handle A, the bonnet will automatically open and be supported on gas struts.
- To close the bonnet, push the bonnet down, make sure it is locked in place and the side panels are located correctly..
- The loader arms must be raised and locked before you remove an engine side panel. Keep the arms locked up until the side panel is put back.
- Do not remove the engine side panel while the engine is running.

Ask



- Ask the students if they have opened and closed the bonnet of a vehicle. If yes then ask the major precaution should be taken to do this.

UNIT 3.6: Seat Belt

Unit Objectives

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

3. Understand the opening and closing of bonnet.
1. Understand the process involve in removing and fitting a side panel.

Notes for Facilitation

- Explain the procedure of opening and closing of bonnet.
- Discuss the procedure of removing and fitting a side panel.

Say

- To release the bonnet, pull handle A, the bonnet will automatically open and be supported on gas struts.
- To close the bonnet, push the bonnet down, make sure it is locked in place and the side panels are located correctly..
- The loader arms must be raised and locked before you remove an engine side panel. Keep the arms locked up until the side panel is put back.
- Do not remove the engine side panel while the engine is running.

Ask

- Ask the students if they have opened and closed the bonnet of a vehicle. If yes then ask the major precaution taken to do this.

UNIT 3.7: Greasing

Unit Objectives



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

1. Understand the procedure of greasing a machine regularly.
2. Grease the essential parts of machines.

Notes for Facilitation



- Explain the procedure of greasing the machine regularly.
- Discuss the steps to be taken before applying grease on the machine.

Say



- Regular greasing will also lengthen the machine's working life. The machine must always be greased after pressure washing or steam cleaning.
- Remove the starter key and disconnect the battery before greasing.
- Greasing should be done with a grease gun. Normally, two strokes of the gun should be sufficient. Stop greasing when fresh grease appears at the joint.
- Do not remove the engine side panel while the engine is running.

Practical



- Show the process of greasing the front axle and rear driveshaft of a HEMM.

UNIT 3.8: Tires and Wheels

Unit Objectives



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

1. Understand the procedure of proper tire inflation.
2. Checking the wheel nut torques.

Notes for Facilitation



- Explain the procedure of tire inflation in a HEMM.
- Discuss the procedure of checking the wheel nut torque.

Say



- If the tire has lost all its air pressure, call in a qualified tire mechanic. The tire mechanic should use a tire inflation gauge and the correct equipment to do the job.
- An exploding tire can kill, inflated tires can explode if overheated. Do not cut or weld the rims. Use a tire/wheel specialist for all repair work..
- Make sure that the air hose is correctly connected to the tire valve. Clear other people from the area. Stand behind the tread of the tire while adding the air.

Ask



- Ask the students if they have used the pressure gauge while inflation a tire. If yes, ask them the procedure of measuring pressure.

UNIT 3.9: Parking Brake Adjustment

Unit Objectives



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

1. Understand the procedure of adjusting parking brake.

Notes for Facilitation



- Explain the procedure of adjusting the parking brake.

Say



- Test the parking brake as per instruction given by manufacturer.
- If there is no more adjustment and pin F is at the end of its travel get the brake checked by your machine dealer.

Ask



- Ask the students if they have ever adjusted the parking brake. If yes then ask them the procedure.

UNIT 3.10: Checking the foot brake fluid level

Unit Objectives



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

1. Understand the procedure of checking the fluid level of foot brake.

Notes for Facilitation



- Explain the procedure of checking fluid level of foot brake.

Say



- Faulty brakes can kill. If you have to add oil to the brake reservoir regularly get the brake system checked by your machine dealer. Do not use the machine until the fault has been removed.
- Using incorrect brake fluid could damage the system. See Service Capacities and Lubricants in maintenance section. The fluid can harm your skin. Wear rubber gloves. Cover cuts and grazes.

Ask



- Ask the students if they have checked the fluid level of foot. If yes then ask them the procedure.

UNIT 3.11: Engine Air Filter

Unit Objectives

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

1. Understand the procedure of changing the elements.

Notes for Facilitation

- Explain the procedure of changing the elements.

Say

- The outer element must be renewed immediately if the warning light on the instrument panel illuminates.
- A new inner element must be fitted at least every third time the outer element is changed. As a reminder, mark the inner element with a felt tipped pen each time the outer element is changed.
- Pulsation ring L is not fitted in this application. 7 Refit the induction hose to stub pipe A. Make sure that the wire is connected to the Air Filter Blocked switch..

UNIT 3.12: Engine oil and filter

Unit Objectives

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

1. Understand the procedure of checking the oil level.
2. Understand the procedure of changing the oil and filter.

Notes for Facilitation

- Explain the procedure of tire checking the oil level.
- Discuss the procedure of changing the oil and filter
- Discuss some precautions which should be taken while changing the oil and filter.

Say

- Make sure the park brake is engaged and the transmission set to neutral. Lower the loader arms and backhoe to the ground; switch OFF the engine and remove the starter key.
- Drain the oil when the engine is warm as contaminants held in suspension will then be drained with the oil. Park the machine on firm ground.
- Oil will gush from the hole when the drain plug is removed. Hot oil and engine components can burn you. Keep to one side when you remove the plug..

Ask

- Ask the students if they have replaced the oil or filter of vehicle. If yes then ask them the procedure.

UNIT 3.13: Engine cooling system

Unit Objectives

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

1. Understand the procedure of checking the coolant of engine.
2. Understand the procedure of changing the coolant of a vehicle.

Notes for Facilitation

- Explain the procedure of checking the coolant of engine.
- Discuss the procedure of changing the coolant of engine.

Say

- The cooling system is pressurized when the coolant is hot. Hot coolant will burn you. Make sure the engine is cool before checking the coolant level or draining the system.
- Make sure the park brake is engaged and the transmission set to neutral. Lower the loader arms and backhoe to the ground; switch OFF the engine and remove the starter key.
- Keep your face away from the drain hole when removing the drain plug.

Ask

- Ask the students if they have changed the coolant of vehicle. If yes then ask them the procedure.

UNIT 3.14: Adjusting the Fan Belt

Unit Objectives

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

1. Understand the procedure of adjusting the fan belt.

Notes for Facilitation

- Explain the procedure of adjusting the fan belt of a HEMM.

Say

- Park the machine on firm level ground, engage the parking brake and set the transmission to neutral. Raise and block the loader arms. Lower the backhoe to the ground and stop the engine.
- Make sure the engine cannot be started. Disconnect the battery before doing this.
- If a new belt is fitted, the belt tension must be checked again after the first 20 hours of operation.

Ask

- Ask the students if they have adjusted the fan belt of HEMM. If yes, ask them the procedure.

UNIT 3.15: Cleaning the cab heater filter

Unit Objectives

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

1. Understand the procedure of cleaning the cab heater filter.

Notes for Facilitation

- Explain the procedure of cleaning the cab heater filter.

Say

- Remove the cover retaining screws (2 off) and then remove the cover.
- Knock loose dust off the filter F. Carefully blow compressed air through all the folds of the filter, blow in the opposite direction to the arrows marked on the filter.
- Refit the cover E and secure with the retaining screws (2 off).

Ask

- Ask the students if they have changed the cab heater filter. If yes, ask them the procedure.

UNIT 3.16: Fuel System

Unit Objectives



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

1. Understand the procedure of filling the fuel tank.

Notes for Facilitation



- Explain the procedure of filling the fuel tank.

Say



- Lower the loader arms and switch off the engine before refuelling. Do not permit operation of the machine controls while refuelling
- At the end of every working day, fill the tank with the correct type of fuel. This will prevent overnight condensation from developing in the fuel..
- Once the key has been removed, the cap will simply rotate on the filler neck. To remove the cap from the filler neck, the key must be reinserted and the cap unlocked

Ask



- Ask the students if they have filled the fuel in vehicle. If yes, ask them the precautions which should be taken care while filling..

UNIT 3.17: Changing the filter element

Unit Objectives



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

1. Understand the procedure of changing the filter element.

Notes for Facilitation



- Explain the procedure of changing the filter element.

Say



- Park the machine on firm level ground, engage the parking brake and set the transmission to neutral. Lower the loader arms and backhoe to the ground, stop the engine..
- To assist with bleeding, fill the new filter element with fuel before fitting. Install new element A hand tight only. Check for leaks.

Ask



- Ask the students if they have changed filter element. If yes, ask them the procedure.

UNIT 3.18: Synchro Shuttle Gearbox

Unit Objectives

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

1. Understand the procedure of checking the oil level of gearbox.
2. Understand the procedure of changing the transmission oil and filter.

Notes for Facilitation

- Explain the procedure of checking the level of transmission oil.

Say

- Make sure the park brake is engaged and the transmission set to neutral. Lower the loader arms and backhoe to the ground; switch OFF the engine and remove the starter key.
- Switch OFF the engine and remove the starter key, wait approximately 20 seconds. Check the oil level and if required, fill to dipstick level.
- Make the machine safe before getting beneath it. Lower the attachments to the ground; engage the parking brake; remove the starter key, disconnect the battery

Ask

- Ask the students if they have checked the level of transmission oil. If yes, ask them the procedure.

UNIT 3.19: Powershift Gearbox

Unit Objectives

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

1. Understand the procedure of changing oil and filter of gearbox.

Notes for Facilitation

- Explain the procedure of changing oil and filter of gearbox.

Say

- When draining JCB 760 Series Powershift gearboxes it is recommended that the oil is drained through the cover plate A to make sure that the debris collected in the transmission sump is flushed out.
- Draining oil through the sump plug will filter oil through the strainer and not flush out the debris.
- Make the machine safe before getting beneath it. Lower the attachments to the ground; engage the parking brake; remove the starter key, disconnect the battery.
- Fit only a genuine supplied JCB filter, otherwise damage to the system may be incurred through contamination.

Ask

- Ask the students if they have changed oil and filter of powershift gearbox. If yes, ask them the procedure.

UNIT 3.20: Hydraulic System

Unit Objectives



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

1. Understand the procedure of checking the hydraulic fluid level.

Notes for Facilitation



- Explain the procedure of checking the hydraulic fluid level.

Say



- Fine jets of hydraulic fluid at high pressure can penetrate the skin. Do not use your fingers to check for hydraulic fluid leaks.
- Do not put your face close to suspected leaks. Hold a piece of cardboard close to suspected leaks and then inspect the cardboard for signs of hydraulic fluid.
- If the fluid in the tube appears cloudy, then water or air has entered the system. The hydraulic pump could be severely damaged if the machine is operated. Contact the manufacturer of machine immediately.

Ask



- Ask the students if they have checked the fluid level of hydraulic system. If yes, ask them the procedure.

UNIT 3.21: Changing the filter element of Hydraulic

Unit Objectives

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

1. Understand the procedure of changing the hydraulic filter element.

Notes for Facilitation

- Explain the procedure of changing the hydraulic filter element.

Say

- Fine jets of hydraulic fluid at high pressure can penetrate the skin. Do not use your fingers to check for hydraulic fluid leaks.
- Do not put your face close to suspected leaks. Hold a piece of cardboard close to suspected leaks and then inspect the cardboard for signs of hydraulic fluid.

UNIT 3.22: Changing the suction strainer

Unit Objectives



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

1. Understand the procedure of changing the suction strainer.

Notes for Facilitation



- Discuss the procedure of changing the suction strainer.

Say



- Make the machine safe before getting beneath it. Lower the attachments to the ground; engage the parking brake; remove the starter key, disconnect the battery.
- Position the machine on level ground. Roll the loader shovel forward and rest it on the ground.
- Retract the extending dipper if fitted. Close the backhoe bucket. Swing in the dipper. Lower the boom until the bucket rests on the ground. Lower the stabilizers to the ground. Stop the engine. Remove the starter key and disconnect the battery

Ask



- Ask the students if they have changed the suction strainer. If yes, ask them the procedure.

UNIT 3.23: Front and Rear Axle

Unit Objectives

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

1. Understand the procedure of checking the differential oil level.

Notes for Facilitation

- Discuss the procedure of checking the differential oil level.
- Discuss the procedure of changing the hub oil.

Say

- The axle oil level must be checked with the machine level, otherwise a false indication of the amount of oil in the axle will be given.
- Make the machine safe before getting beneath it. Lower the attachments to the ground; engage the parking brake; remove the starter key, disconnect the battery.
- The axle oil is used to lubricate the brake components and cool the brake plates. It is important that the oil is changed regularly as specified in the service schedule - the lubricating properties of the oil will reduce as a result of brake wear.
- The front axle procedures are the same as described on the previous pages (all wheel steer machines).

Ask

- Ask the students if they have changed the oil of hub and differential. If yes, ask them the procedure.

UNIT 3.24: Checking the axle oil level

Unit Objectives



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

1. Understand the procedure of checking the oil level.
2. Understand the procedure of changing the axle oil.

Notes for Facilitation



- Discuss the procedure of checking and changing the axle oil.

Say



- The axle oil is used to lubricate the brake components and cool the brake plates. It is important that the oil is changed regularly as specified in the service schedule - the lubricating properties of the oil will reduce as a result of brake wear.
- Oil will gush from the hole when the drain plug is removed keep to one side when you remove the plug. Remove the drain plug B. Allow the oil to drain out. The drain plug is magnetic. Wipe it clean. (Metallic particles should be carefully removed). Clean and refit the drain plug B.

Ask



- Ask the students if they have changed the axle oil. If yes, ask them the procedure.

UNIT 3.25: Battery

Unit Objectives

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

1. Understand the procedure of checking the battery.
2. Understand the procedure of maintenance of battery.
3. Understand the procedure of checking the electrolyte level

Notes for Facilitation

- Discuss the major points for maintenance of battery.

Say

- Do not disconnect the battery while the engine is running, otherwise the electrical circuits may be damaged.
- Battery electrolyte is toxic and corrosive. Do not breathe the gases given off by the battery. Keep the electrolyte away from your clothes, skin, mouth and eyes. Wear safety glasses
- Batteries give off explosive gases. Keep flames and sparks away from the battery. Do not smoke close to the battery.
- Maintenance free batteries used in normal temperate climate applications should not need topping up. However, in certain conditions such as prolonged operation at tropical temperatures.

UNIT 3.26: Hydraulic oil cooler

Unit Objectives

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

1. Understand the procedure of cleaning the tubes/fins.

Notes for Facilitation

- Discuss the procedure of cleaning the tubes/fins.

Say

- The hydraulic oil cooler is in front of the engine radiator. If the hydraulic oil cooler tubes/fins get clogged (by dirt and flies etc) the radiator and cooler will be less efficient.
- Park the machine on firm level ground, engage the parking brake and set the transmission to neutral.

Ask

- Ask the students if they have cleaned the tubes/fins. If yes, ask them the procedure.

UNIT 3.27: Stabiliser Legs (Side shift Machines only)

Unit Objectives

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

1. Understand the procedure replacing wear pads.
2. Understand the procedure of adjustment of wear pads.

Notes for Facilitation

- Discuss the procedure of adjusting wear pads.

Say

- The wear pads support and guide the inner leg section. They ensure that during extension and retraction the inner leg is kept central and has a minimum amount of 'float'..
- Lower wear pads comprise adjustable pads B (2 off) and fixed pads C (2 off). When pads A and C have worn to a minimum thickness of 0.5 mm (0.020 in).
- It is very important that the wear pads are adjusted at the correct service intervals, as the inner leg could contact the outer leg and scoring could occur. Scoring will dramatically reduce wear pad life.

Ask

- Ask the students if they have adjusted the wear pads. If yes, ask them the procedure.

UNIT 3.28: Air Conditioning (if Fitted)

Unit Objectives

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

1. Understand the overview of air conditioning
2. Understand the procedure of adjusting the compressor drive belt.

Notes for Facilitation

- Discuss the procedure of adjusting the compressor drive belt.

Say

- The air conditioning system is a closed loop system and contains pressurized refrigerant.
- No part of the system should be disconnected until the system has been discharged by a refrigeration engineer or a suitably trained person. You can be severely frostbitten or injured by escaping refrigerant.
- Loosen bolts A, B and C. Position the compressor so that there is 10 mm (3/8 in) slack at point X. and tighten bolt A, then bolts B and C.

Ask

- Ask the students if they have adjusted the compressor drive belt. If yes, ask them the procedure.

UNIT 3.29: Hose Burst Protection Valve (if fitted)

Unit Objectives



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

1. Understand the procedure of checking hose burst protection valve

Notes for Facilitation



- Discuss the procedure of checking hose burst protection valve.
- Discuss the procedure of lowering a load.

Say



- The hose burst protection valves (if fitted) prevent the loader or backhoe falling in the event of a hose burst. These valves may be fitted on rams which raise or lower the loader arms, the boom or the dipper.
- During normal operation, the engine must be running before a load can be lowered. The following paragraphs describe how to safely and correctly lower a load in the event of engine failure or a hose burst.





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4. Health and Safety

Unit 4.1 – Safety, Health and Hygiene

Unit 4.2 – First aid

Key Learning Outcomes

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

1. Identify the common safety measures while working in studio.
2. Describe the benefits of health.
3. Describe the measures to be taken to maintain hygiene in workshop.
4. Describe about the common accidents that occur in workshop.
5. Describe the preventive measures to be taken to minimize accidents.
6. Learn the procedure to use fire extinguisher
7. Learn the ingredients of First-Aid Kit.
8. Learn the methods of giving First-Aid in case of accident.

UNIT 4.1: Safety, Health, and Hygiene

Unit Objectives

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

1. Know the general safety measures while working in studio.
2. Understand the benefits of health.
3. Know the measures to be taken to maintain hygiene in workshop

Notes for Facilitation

- Discuss the importance of safety at the workplace. Give some live examples if you have.
- Discuss what PPE (Personal Protective Equipment) is.
- Ask the students to discuss the important things to be taken care of while working in workshop.
- Ask the student what is the definition of health.
- Tell the correct definition of health and discuss its importance.

4.1.1: General Safety Rules

Say



- There are some safety rules which are common on every type of manufacturing work. Like, you should never drink liquor when you are on work.
- You should not ignore the safety rules as it may cause injury to you and your colleagues nearby.

Do



- Explain to the participants the importance safety rules.
- Divide the class into two groups and ask them to tell general safety rules one by one.
- If first group is not able to suggest safety rule then pass it to other.
- Give points to the groups on each correct safety rule suggested for engraving studio.

Demonstrate



- Rearrange the desks in the classroom in random way so that there is very narrow passage to pass through them.
- Ask one student to run through the passage and ask the other student to run behind him to catch.
- Soon the student will get stuck in the passage or hit the desk. Tell the students if the things were arranged properly this should not have happened.

Steps: General Safety Rules



- Work intelligently.
- Keep studio space neat and orderly.
- Ensure appropriate ventilation.
- Have proper protective gear and cleaning supplies available.
- Wash hands and other exposed body parts after working, and before eating or using the bathroom.
- Maintain your health and fitness.

Summarize



- Summarize the general safety rules.

4.1.2: General Hazards Associated with Metal Working

Say



- There are some safety rules specific to metal working. Like, metal cleaners contain caustics (sodium hydroxide) which may be toxic by inhalation, ingestion, and skin/eye contact so you should avoid direct contact.
- You should not ignore the safety rules as it may cause injury to you and your colleagues nearby.

Do



- Explain to the participants about the importance of safety rules.
- Divide the class into two groups and ask them to tell safety rules related to metalworking one by one.
- If first group is not able to suggest safety rule then pass it to other.
- Give points to the groups on each correct safety rule suggested for engraving studio.

Explain: General Hazards Associated with Metal Working



- Explain general hazards and safety in anodizing
- Explain general hazards and safety in electroplating
- Explain general hazards and safety in forging or smithing
- Explain general hazards and safety in foundry
- Explain general hazards and safety in gilding
- Explain general hazards and safety in grinding and polishing
- Explain general hazards and safety in melting/pouring metal
- Explain general hazards and safety in niello
- Explain general hazards and safety in patina
- Explain general hazards and safety in pickling
- Explain general hazards and safety in soldering

Summarize



- Summarize the safety rules and hazards related to metalworking processes.

4.1.3: Health

Say



- There is a famous proverb "Health is Wealth" which means if a person is healthy he/she can do work and earn wealth.
- As defined by World Health Organization (WHO), Health is a "State of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity."
- We should always stay healthy by mind, body and soul.

Explain



- Explain to the participants the importance of health.
- Explain the methods to stay mentally healthy.
- Explain the methods to stay physically healthy.
- Explain why it is important to be healthy by soul means having good thoughts for work as well as your colleagues.

Demonstrate



- Demonstrate the ill effects of bad habits on health via videos and encourage the students to quit bad habits if they have any.

Summarize



- Summarize the methods to stay healthy and fit.

4.1.4: Maintaining Personal Hygiene

Say



- Personal hygiene is a very important aspect of human which differentiate us from animals.
- Personal hygiene involves very basic things like taking bath regularly, brushing teeth etc.

Explain



- Explain the importance of maintaining personal hygiene.
- Explain how we can maintain personal hygiene.

Demonstrate



- Demonstrate the effect of not maintaining personal hygiene with the help of videos.

Summarize



- Summarize the methods to maintain personal hygiene.

4.1.5: Mine Safety Legislation

Say



- In earlier years when mining activities were modest in scale, safety problems too were simple.
- Personal hygiene involves very basic things like taking bath regularly, brushing teeth in 1895, the Government of India initiated steps to frame legislative measures for safety of workmen.

Explain



- Explain the need of mine safety legislation.
- Discuss some acts, guidelines, and rules of health and safety in mining industries.

Summarize



- Summarize the mine safety legislation.

4.1.6: Safety with Vehicles

Say



- Mines are striving for the goal of Zero Injuries all the time.
- Ensure that the machine or equipment is locked out before work is started.
- Ensure that the equipment has cooled down before work is started.
- Communication between people is of the utmost importance when more than one person has to perform work in a confined space or area.

Explain



- Explain the importance of safety while working with mining vehicle or HEMM.
- Discuss some rules to follow while maintenance works of HEMM.
- Discuss some rules to concentrate on the work.
- Discuss the major points for not ignoring the hazards conditions.

Demonstrate



- Demonstrate the effect of ignoring hazards personal safety and health with the help of videos.

Summarize



- Summarize the terms of safety with vehicles.

4.1.7: Safety with power tools

Say



- Mines are striving for the goal of Zero Injuries all the time.
- Ensure that the machine or equipment is locked out before work is started.
- Ensure that the equipment has cooled down before work is started.
- Communication between people is of the utmost importance when more than one person has to perform work in a confined space or area.

Explain



- Explain the necessity of safety with power tools.
- Discuss the importance of PPE while using the power tools.
- Discuss some do's and don'ts, while using power tools.

Demonstrate



- Demonstrate the precautions which should be taken care while using power saws.

Summarize



- Summarize the terms of safety with power tools.

4.1.8: Safety with welding

Say



- A wide variety of tools and machinery are used on the mines. From all the work related activities welding are the most likely to result in burn injuries and contribute to igniting dangerous fires.
- Welding, cutting, and brazing operations involve hazardous hot work.
- About 6 percent of industrial fires resulting in loss of human life are due to unsafe welding or cutting operations.
- Use the "Three Fs" of welding to make safety issues easy to remember.

Explain



- Discuss some tools and equipments used in welding process.
- Explain the importance of safety while working on welding machine.
- Explain the "Three F's" in welding safety path.
- Discuss some guidelines to safe welding.

Demonstrate



- Demonstrate the welding process as per safety guidelines.

Summarize



- Summarize the terms of safety with welding process.

4.1.9: Safety with machinery

Say



- The mining industry has developed machine safety programs with interventions and control technologies to reduce injuries to personnel working near machinery and mobile equipment.
- Mining companies are also steadily introducing their preferred safety systems across global operations.
- Powered haulage and machinery accidents accounted for 47% of all mining fatalities and 22% of all nonfatal days lost injuries in the mining industry from 2004 to 2008.

Explain



- Explain the importance of safety while working with mining machinery.
- Discuss some safety procedure while working with mining machinery.
- Discuss some major factors which can cause accidents while working with mining machinery.

Demonstrate



- Demonstrate some steps to enhance safety with mining machinery.

Summarize



- Summarize the terms of safety with machinery.

4.1.10: Avoid accidents

Say



- Too many mineworkers are injured or killed in accidents that could be described as “struck by” or Caught between” accidents.
- Workers who don't operate moving vehicles can protect themselves by being alert at all time.
- Machine workers also face these types of accidents

Explain



- Explain the types of “struck by” accidents.
- Discuss points which should be considered when not operating the vehicle.
- Discuss some precautions which should be taken in case of fallen objects in the mining area.

Summarize



- Summarize the terms of safety with to avoid accidents.

4.1.11: Protective clothing

Say



- Many injuries can be prevented by wearing the correct protective clothing/ gear.
- Higher-visibility gear is also important at the mine and especially when dealing with traffic at the mining site.
- Thick leather, which affords the most abrasion resistance, can be uncomfortable in high temperatures, may cause heat stress & loss of control with insufficient fluid replacement.

Explain



- Explain the importance of weather protection.
- Discuss some protective gear which should be used for greater mining safety.
- Discuss some safety gears which were used in mining.

Demonstrate



- Demonstrate the working of some major protection equipment.

Summarize



- Summarize the terms of safety with protective clothing.

UNIT 4.2: First aid

Unit Objectives

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

1. Describe the common accidents that occur in workshop.
2. Describe the preventive measures to be taken to minimize accidents.
3. Learn the procedure to use fire extinguisher
4. Learn the ingredients of First-Aid Kit.
5. Learn the methods of giving First-Aid in case of accident.

Notes for Facilitation

- Discuss the common accidents that can occur in the workshop.
- Ask the students to suggest preventive measures by giving them some situations one by one.
- Discuss the preventive measures to be taken to minimize accidents.
- Explain various types of fire extinguishers.
- Demonstrate the functioning of fire extinguisher.
- Discuss the importance of First-Aid Kit
- Discuss about various components of First-Aid Kit.
- Demonstrate methods of giving First-Aid in case of emergency.

4.2.1: What is an Accident?

Say



- An **accident** is a specific, unpredictable, unusual and unintended external action which occurs in a particular time and place, with no apparent and deliberate cause but with marked effects.

Explain



- Explain the types of accidents.

Demonstrate



- Demonstrate the common occurring accidents through videos or chart.

Summarize



- Summarize the types of accidents and measures to be taken to stop them.

4.2.2: What is a Fire Extinguisher?

Say



- Fire extinguishers are fire protection device used to extinguish or control small fires.

Explain



- Explain the types of fire extinguishers.
- Explain the use of different type of fire extinguishers.
- Explain the importance of proper pressure in the fire extinguisher and how to read pressure.

Demonstrate



- Demonstrate the types of fire extinguishers.
- Demonstrate the parts of fire extinguisher and use of each part.

Summarize



- Summarize the types of accidents and measures to be taken to stop them.

Activity



- Ask the students to assemble together.
- Explain the purpose and duration of the activity.
- Set guidelines pertaining to discipline and expected tasks.

Skill Practice	Time	Resources
Use of different type of Fire Extinguisher	6 hours	Fire Extinguisher, wood, plastic, electric supply and arrangement for short circuit, petrol to set mock fire

Do



- Ask the volunteer to come forward for using Fire Extinguisher.
- Ask the rest of students to keep a safe distance from the mock test area and watch very carefully.
- Go around and make sure the distance is safe.
- Handle different type of fire extinguishers to volunteers.
- Charge different type of mock fires in the open area and ask volunteers to extinguish the fire.

4.2.3: First Aid and First Aid Kit

Say



- First Aid is the assistance given to any person suffering a sudden illness or injury with care provided to preserve life, prevent the condition from worsening, or promote recovery.
- First-Aid Kit is an important part of tool kit. Accidents can occur anywhere so First Aid Kit should always be available in the toolbox.

Explain



- Explain the importance of First Aid Kit.
- Explain the methods of first aid in different situations.

Demonstrate



- Demonstrate the First Aid procedures in different situations.

Summarize



- Summarize the items in First Aid kit and the procedure to give first aid in different situations.

Role Play



- Ask the students to assemble together.
- Form the groups of 2-2 students.
- Ask one student in a group to provide first aid to other student in a given situation.
- Similarly, give different situations of first aid to each student.

Skill Practice	Time	Resources
Providing First Aid	8 hours	First Aid kit, notebook

Do



- Note down the performance of each group in providing first-aid.
- Once the role play is over, discuss the good and bad of students' performance.

4.2.5: Personal Protective Equipment (PPE)

Say



- Personal protective equipment (PPE) refers to protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury or infection. The hazards addressed by protective equipment include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter

Explain



- Explain the importance of PPE.

Demonstrate



- Demonstrate the components of personal protective equipment.





5. Employability & Entrepreneurship Skills

Unit 5.1 – Personal Strengths & Value Systems

Unit 5.2 – Digital Literacy: A Recap

Unit 5.3 – Money Matters

Unit 5.4 – Preparing for Employment & Self Employment

Unit 5.5 – Understanding Entrepreneurship Unit

Unit 5.6 – Preparing to be an Entrepreneur

Key Learning Outcomes

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

1. Understand value system
2. Appreciate the role of digital literacy
3. Understand Money Matters
4. Appreciate the concept of self-employment
5. Who is entrepreneur
6. How to be an entrepreneur

Unit 5.1: Personal Strength and Value System

Unit Objectives

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

- Explain the meaning of hygiene
- Understand the purpose of Swacch Bharat Abhiyan
- Explain the meaning of habit
- Discuss ways to set up a safe work environment
- Discuss critical safety habits to be followed by employees
- Explain the importance of self-analysis
- Understand motivation with the help of Maslow's Hierarchy of Needs
- Discuss the meaning of achievement motivation
- List the characteristics of entrepreneurs with achievement motivation
- List the different factors that motivate you
- Discuss how to maintain a positive attitude
- Discuss the role of attitude in self-analysis
- List your strengths and weaknesses
- Discuss how to foster a good work ethic
- List the characteristics of highly creative people
- List the characteristics of highly innovative people
- Discuss the benefits of time management
- List the traits of effective time managers
- Describe effective time management technique
- Discuss the importance of anger management
- Discuss the symptoms of stress
- Discuss tips for stress management

Notes for Facilitation



1. Ensure all the required material and equipment related to session is in place and in proper working condition before starting the session.
2. Before beginning the session, ask the students about what they learnt in the last session.
3. Explain the Objectives of the current session.
4. Use power point presentation to describe the topic.
5. Give assignment to measure the student understanding of the topic
6. Ensure that the session plan should be followed according to time duration to complete the course in-time
7. Discuss the assignment questions with the students and provide correct answers.
8. At the end of the session summarize the key learning.

Ask



- Q1. Q1. What is WHO?
- Q2. How is hygiene and Health related?
- Q3. What is self actualization in Maslows pyramid?
- Q4. Why is positive attitude important?
- Q5. What is meaning of ethics?
- Q6. What is innovation?
- Q7. What is cognitive restructuring?

Unit 5.2: Digital Literacy: A Recap

Unit Objectives



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

1. Identify the basic parts of a computer
2. Identify the basic parts of a keyboard
3. Recall basic computer terminology
4. Recall basic computer terminology
5. Recall the functions of basic computer keys
6. Discuss the main applications of MS Office
7. Discuss the benefits of Microsoft Outlook
8. Discuss the different types of e-commerce
9. List the benefits of e-commerce for retailers and customers
10. Discuss how the Digital India campaign will help boost e-commerce in India
11. Describe how you will sell a product or service on an e-commerce platform

Notes for Facilitation



1. Ensure all the required material and equipment related to session is in place and in proper working condition before starting the session.
2. Before beginning the session, ask the students about what they learnt in the last session.
3. Explain the Objectives of the current session.
4. Use power point presentation to describe the topic.
5. Give assignment to measure the student understanding of the topic
6. Ensure that the session plan should be followed according to time duration to complete the course in-time
7. Discuss the assignment questions with the students and provide correct answers.
8. At the end of the session summarize the key learning.

Ask



- Q1. What is a cursor?
- Q2. What does ESC do?
- Q3. What is Microsoft Access?
- Q4. Explain B2B and C2C?

Unit 5.3: Money Matters

Unit Objectives



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

1. Discuss the importance of saving money
2. Discuss the benefits of saving money
3. Discuss the main types of bank accounts
4. Describe the process of opening a bank account
5. Differentiate between fixed and variable costs
6. Describe the main types of investment options
7. Describe the different types of insurance products
8. Describe the different types of taxes
9. Discuss the uses of online banking
10. Discuss the main types of electronic funds transfers

Notes for Facilitation

1. Ensure all the required material and equipment related to session is in place and in proper working condition before starting the session.
2. Before beginning the session, ask the students about what they learnt in the last session.
3. Explain the Objectives of the current session.
4. Use power point presentation to describe the topic.
5. Give assignment to measure the student understanding of the topic
6. Ensure that the session plan should be followed according to time duration to complete the course in-time
7. Discuss the assignment questions with the students and provide correct answers.
8. At the end of the session summarize the key learning.

Ask



- Q1. Why is investing important?
 Q2. What are recurring accounts?
 Q3. What is the Nature of Variable costs?
 Q4. What is a Private equity?
 Q5. What is Capital gain tax?
 Q6. What is RTGS?

Unit 5.4: Preparing for Employment & Self Employment

Unit Objectives



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

1. Discuss the steps to prepare for an interview
2. Discuss the steps to create an effective Resume
3. Discuss the most frequently asked interview questions
4. Discuss how to answer the most frequently asked interview questions
5. Discuss basic workplace terminology

Notes for Facilitation



1. Ensure all the required material and equipment related to session is in place and in proper working condition before starting the session.
2. Before beginning the session, ask the students about what they learnt in the last session.
3. Explain the Objectives of the current session.
4. Use power point presentation to describe the topic.
5. Give assignment to measure the student understanding of the topic
6. Ensure that the session plan should be followed according to time duration to complete the course in-time
7. Discuss the assignment questions with the students and provide correct answers.
8. At the end of the session summarize the key learning.

Ask



- Q1. Why is preparation important for interview?
- Q2. What will you include in personal skills?
- Q3. Why do you want the job- reasoning?
- Q4. How will you identify strengths?
- Q5. What does CV stand for?

Unit 5.5: Understanding Entrepreneurship

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. Describe 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 important problem solving traits
14. Discuss ways to assess problem solving skills
15. Discuss the importance of negotiation
16. Discuss how to negotiate
17. Discuss how to identify new business opportunities
18. Discuss how to identify business opportunities within your business
19. Understand the meaning of entrepreneur
20. Describe the different types of entrepreneurs
21. List the characteristics of entrepreneurs
22. Recall entrepreneur success stories
23. Discuss the entrepreneurial process
24. Describe the entrepreneurship ecosystem

Notes for Facilitation



1. Ensure all the required material and equipment related to session is in place and in proper working condition before starting the session.
2. Before beginning the session, ask the students about what they learnt in the last session.
3. Explain the Objectives of the current session.
4. Use power point presentation to describe the topic.
5. Give assignment to measure the student understanding of the topic
6. Ensure that the session plan should be followed according to time duration to complete the course in-time
7. Discuss the assignment questions with the students and provide correct answers.
8. At the end of the session summarize the key learning.

Ask



- Q1. What is entrepreneurship?
- Q2. What makes a good entrepreneur?
- Q3. What is a LLP?
- Q4. How is reinvention important?
- Q5. What are two elements of problem solving?
- Q6. What is SWOT analysis?
- Q7. Name two types of entrepreneurs.
- Q8. What is Make in India campaign?
- Q9. What is Risk Appetite?

Unit 5.6: Preparing to be an Entrepreneur

Unit Objectives



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

1. Discuss how market research is carried out
2. Describe the 4 Ps of marketing
3. Discuss the importance of idea generation
4. Recall basic business terminology
5. Discuss the need for CRM
6. Discuss the benefits of CRM
7. Discuss the need for networking
8. Discuss the benefits of networking
9. Understand the importance of setting goals
10. Differentiate between short-term, medium-term and long-term goals
11. Discuss how to write a business plan
12. Explain the financial planning process
13. Discuss ways to manage your risk
14. Describe the procedure and formalities for applying for bank finance
15. Discuss how to manage your own enterprise
16. List important questions that every entrepreneur should ask before starting an enterprise

Notes for Facilitation



1. Ensure all the required material and equipment related to session is in place and in proper working condition before starting the session.
2. Before beginning the session, ask the students about what they learnt in the last session.
3. Explain the Objectives of the current session.
4. Use power point presentation to describe the topic.
5. Give assignment to measure the student understanding of the topic
6. Ensure that the session plan should be followed according to time duration to complete the course in-time
7. Discuss the assignment questions with the students and provide correct answers.
8. At the end of the session summarize the key learning.

Ask



1. What are the 4 P;'s?
2. What is Depreciation?
3. What is ROI?
4. Why is networking important?
5. How will one set goals?
6. What is business plan?
7. What are channels of distribution?
8. What documents must be prepared for loans?
9. What is seed funding?





6. Annexures

Annexure I : Training Delivery Plan

Annexure II : Criteria for Assessment Trainees

Annexure I

Training Delivery Plan

Training Delivery Plan			
Program Name:	HEMM Mechanic		
Qualification Pack Name & Ref. ID	MIN/Q 0433		
Version No.	1	Version Update Date	12.12.2015
Pre-Requisites to Training (if any)	Preferably ITI (Motor Vehicle Mechanic), Technical and gallery training as per first schedule, Mining Vocational Training Rules (MVTR) 1966 (suggested but not mandatory).		
Training Outcomes	By the end of this program, the participants would have achieved the following competencies:		
	1. Carry out maintenance and repair of mechanical systems in HEMM		
	2. Carry out maintenance and repair and overhaul of crushers, heavy earth moving machinery.		
	3. Carry out maintenance and repair and overhaul medium and light vehicles, pumps and compressors and other mechanical equipment and assemblies Used in a mine.		
	4. Identify and use basic tools, equipment & materials required for maintenance.		
	5. Be well versed with Environment Health & Safety: Well versed with health and safety measures in terms of personal safety and controls emergency Operations		

Module No	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools/Aids	Duration
1		Introduction to Mines	<p>At the end of the session, the learner will be able to –</p> <ul style="list-style-type: none"> Describe the overview of a mine- open cast & u/g mine. Differentiate between the types of mines and know details of the mine he is working in. Restate Mine Organization, time keeping, need for discipline and punctuality. Perform benching in quarries, dressing of overhangs, undercuts, fencing. 	MIN/N 0491 KA1, KA2, KA3 MIN/N 0492 KA1, KA2, KA3 MIN/N 0901 KA1	<ul style="list-style-type: none"> Instructor Led Training (ILT) Lecture 	<ul style="list-style-type: none"> Projector Laptop 	1
					<ul style="list-style-type: none"> Mine Visit 	<ul style="list-style-type: none"> Model of Open cast Mine 	2
2		Brief Introduction about Mining Machines and Safety Procedures	<p>At the end of the session, the learner will be able to –</p> <ul style="list-style-type: none"> Differentiate the various types of heavy earth moving machines (H.E.M.M) used in open cast mines and their specific functions. Follow the manufacturer's instructions for care and safe operation of the equipment. Recall mining safety procedures. Identify sources of dust, noise and vibration and measures to minimize them. 	MIN/N 0901 PC11, KA6, KA09, KA10	<ul style="list-style-type: none"> Instructor Led Training (ILT) Lecture 	<ul style="list-style-type: none"> Projector Laptop Machine Manual 	1
					<ul style="list-style-type: none"> Practical Demonstration 	<ul style="list-style-type: none"> HEMM Machine-Dumper/Shovel 	1
3		Importance & Types of Maintenance of Mining Machines	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> List the different types of maintenance. Differentiate between breakdown maintenance and preventive maintenance. Recall original equipment manufacturers' specifications and follow standard operating procedures set out for diagnosing faults. Carry out routine maintenance, including checking vehicle condition against OEM specifications to identify damage, corrosion, wear and tear, fluid levels, leaks and other problems in serviceability relevant to engine and aggregates, steering system, clutch and brake assembly etc. 	MIN/N 0492 KC3 MIN/N 0491 PC3	<ul style="list-style-type: none"> Instructor Led Training (ILT) Theory 	<ul style="list-style-type: none"> Projector Laptop 	0 . 5

4	Introduction	Code of Traffic and Mine Rules At the end of the session, the learner will be able to - <ul style="list-style-type: none"> Follow the code of traffic in specific areas of mine. Define the significance of fences. Summarize the standing orders in force at the mine. Practice safety in the vicinity of machinery List the duties of workmen under Mines Act. Recall the provision of wages, working hours and accident compensation as per Mines Act. Enumerate the impact of violation of safely procedures. 	MIN/N 0901 KA3, KA4, KA7 MIN/N 0492 KA4, KA6, KA7, KA9 MIN/N 0491 KA4, KA6, KA7, KA9	<ul style="list-style-type: none"> QBD (Question based discussion) Lecture 	<ul style="list-style-type: none"> Projector Laptop 	0.5
				<ul style="list-style-type: none"> Mine Visit 	<ul style="list-style-type: none"> HEMM Machine-Dumper/Shovel Safety poster 	2
5	Diagnose HEMM	Tools & Fittings At the end of the session, the learner will be able to – <ul style="list-style-type: none"> Recognize various types of tools and their uses. Identify various types of fasteners, nuts and bolts, threads, seals and couplings. Select the standard materials for the job such as seals, sealants, fittings, gaskets, joints, fasteners etc. as per manufacturers' specification. Select the tools used to assess and confirm technical faults that cannot be determined through a visual inspection, including use of (but not limited to): <ul style="list-style-type: none"> ✓ pressure indicators: fuel pressure testers, manifold gauge sets, Oil pressure gauges, tire pressure gauges. ✓ measuring equipment: Vernier calipers, micrometer, feeler Gauges, multi-meter, flow meter, temp gauge, dial gauge etc. 	MIN/N 0492 KC2 MIN/N 0491 KC2	<ul style="list-style-type: none"> Instructor Led Training (ILT) Question Based Learning 	<ul style="list-style-type: none"> Projector Laptop 	2
				<ul style="list-style-type: none"> Workshop visit 	<ul style="list-style-type: none"> Tool Box* fasteners, nuts and bolts, threads, seals and couplings 	1

6	Diagnose HEMM	Plan and Organize Scheduled Maintenance	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> Follow OEM recommended procedure and checklist for routine servicing. Cross check tasks to be carried out with superiors in case of non-routine service or repair. Confirm that the correct spare parts, lubricants, tools and other materials required have been obtained. Match the type and quality of components specified by the OEM for use as replacement parts. Conduct scheduled routine examination methods and assessments against vehicle specifications to identify damage, corrosion, inadequate fluid levels, leaks, wear and tear, security problems and general condition and serviceability of the machine. Plan and organize the work activities so that sorting/accessing is easy. Use common sense and make judgments during day to day functioning. Use reasoning skills to identify and resolve basic problems. 	MIN/N 0492 PC1, PC2, PC3 MIN/N 0492 KC4, SB1, SB2, SB3, SB4 MIN/N 0901 PC1 MIN/N 0491 SB1, SB2, SB3, SB4	<ul style="list-style-type: none"> QBD (Question based discussion) Instructor Led Training (ILT) Lecture 	<ul style="list-style-type: none"> Projector Laptop 	1
					<ul style="list-style-type: none"> Group Discussion Think Pair Share 	<ul style="list-style-type: none"> Color Pen Chart Paper 	4
7	Diagnose HEMM	Vehicle Inspection	<p>At the end of the session, the learner will be able to –</p> <ul style="list-style-type: none"> List the various sources of information available for assessing service and repair requirements of the vehicle. Review complaint sheet and understand repair requirements. Diagnose displays, visual inspections, test drive vehicle/equipment as per manufacturer specifications. Note down observations. Follow standard operating procedures for diagnosis. Select the standard materials for the job such as seals, sealants, fittings, gaskets, joints, fasteners etc. as per manufacturers' Specification. Identify faults and failures that necessitate replacement of Components and other units. Use diagnostic tools as required to assess the problem, this includes using on board diagnostic computer to attain vehicle data and compare the same with standard output to detect faults in the 	MIN/N 0491 PC2, PC4, PC5,PC1 1, PC8, KC3, SA1, SB6 MIN/N 0492 KC2, KC7, SB6	<ul style="list-style-type: none"> Instructor Led Training (ILT) Theory 	<ul style="list-style-type: none"> Projector Laptop 	1
					<ul style="list-style-type: none"> On the Job Training 	<ul style="list-style-type: none"> Tappet Wrench Flywheel puller Tool Box HEMM Machine-Shovel/Dumper 	4

			<p>System.</p> <ul style="list-style-type: none"> • Recognize cosmetic damage to vehicle components and units Outside normal service items. • Follow instructions and work on areas of improvement identified. 				
8	Diagnose HEMM	Lubrication	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> • Select the correct lubricant and refill correct grade of lubricants as per OEM. • Discuss different methods of lubrication. • Check lubricant levels and identify codes and grades of lubricants to be used for specific components of HEMM. • Select the grade of lubricants specified by the OEM for use. • List the various types of lubricants and their importance. • Undertake the storage and handling of lubricants. • Check fluid levels, leaks and other problems. 	MIN/N 0492 KC5, KC3, PC7 MIN/N 0491 PC9	<ul style="list-style-type: none"> • Instructor Led Training (ILT) • Theory 	<ul style="list-style-type: none"> • Projector • Laptop 	1
					<ul style="list-style-type: none"> • OJT • Practice by doing 	<ul style="list-style-type: none"> • Different lubricants – Servo 421 • Lubricating pumps • Tool Box 	5
9	Diagnose HEMM	Bearing	<p>At the end of the session, the learner will be able to –</p> <ul style="list-style-type: none"> • Adhere to maintenance schedule recommended by the equipment manufacturer. • Calibrate, align and adjust settings, alignment, pressures, tension, speeds and levels relevant to load bearing arms and safety device, components installed. • Open and re-assemble various types of bearings in machines and know their assembly techniques. • Adjust safety valves and hydraulic systems for smooth operation. 	MIN/N 0492 PC4	<ul style="list-style-type: none"> • Question based Learning 	<ul style="list-style-type: none"> • Simulator Training • Laptop 	1
					<ul style="list-style-type: none"> • Practical based training 	<ul style="list-style-type: none"> • Bearing Model • Tool Box • 10 tonne crane • Ropes, slings, towing 	5

						lifting Jack	
10	Diagnose HEMM	Tire and Wheel	At the end of the session, the learner will be able to - <ul style="list-style-type: none">• Recognize the different type of tires of heavy earth moving machines and their wheels.• Identify hot & cold tire pressure as per size of tire.• Check and make adjustments to clearances, gaps, settings, alignment, pressures, and tension.	MIN/N 0491 KC1, PC6	• Lecture	• Laptop • Projector	1
					• Practical Demonstration	• HEMM tire and wheels • Wheel balancer • Pneumatic wrenches • Tire pressure gauge	5
11	Diagnose HEMM	Record Keeping	At the end of the session, the learner will be able to - <ul style="list-style-type: none">• Maintain a checking/maintenance logbook to record all activities performed.• Write information documents or enter the information in online ERP systems under guidance of the supervisor.• Note down observations.• Maintain inventory of spares and other supplies as per requirements.• Assess when the problem is beyond his competence and report the problem to suitably qualified and competent personnel.	MIN/N 0491 SA1,SA2 MIN/N 0492 SA1, SA2	• Question based Training	• Projector • Laptop	2
					• Practical Demonstration	• Log book • Inventory reports • Breakdown reports	2
12	Diagnose	Reporting Matrix	At the end of the session, the learner will be able to – <ul style="list-style-type: none">• Know job specific documents e.g. daily maintenance checklist and its significance.• Weigh risk and impact of not following defined procedures/work instructions.	MIN/N 0901 KA11 MIN/N 0491	• Case Study • Lecture	• Projector • Laptop	2

			<ul style="list-style-type: none">• Outline escalation matrix for reporting identified problems.• Follow rules and regulations of mine as per standard operating procedure (SOP).• Estimate the cost of equipment and loss and delay for the company that result from un-operational equipment.• Describe the implications of delays in process to the company.• List all direct /indirect cost of accidents to the company.• Summarize duties and responsibilities associated with his job role as per the employer.• Recall the hazardous material safety and security rules and regulations as prescribed by DGMS.	KB1, KB2, KB3, KB4, KB5, KB6 MIN/N 0492 KB1, KB2, KB3, KB4, KB5, KB6, KB7, KB8	<ul style="list-style-type: none">• Think pair share activity• Activity based Training	<ul style="list-style-type: none">• Chart paper• Color pens	2
13	Diagnose HEMM	Reading Skills	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none">• Read maintenance manual and read information documents.• Read and interpret symbols and measurements.• Follow information documents.• Discuss and analyze the available data about the site.• Read and comprehend the instructions manual.• Plan and follow hourly maintenance.	MIN/N 0491 SA3, SA4, SA5 MIN/N 0492 SA3, SA4, SA5	<ul style="list-style-type: none">• Theory• Experience Sharing	<ul style="list-style-type: none">• Projector• Laptop	3
					<ul style="list-style-type: none">• Activity based Training	<ul style="list-style-type: none">• Any dumper maintenance manual• Chart paper• Color pens	1
14	Diagnose HEMM	Team Building	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none">• Participate like a team player and achieve collective goals.• Share knowledge with supervisors and subordinates.• Detect problems in day to day tasks.• Discuss possible solution with the supervisor for problem solving.	MIN/N 0491 SB9, SB10 MIN/N 0492 SB9, SB10	<ul style="list-style-type: none">• Role Play• Experience Sharing	<ul style="list-style-type: none">• Projector• Laptop	1
					<ul style="list-style-type: none">• Activity based Training	<ul style="list-style-type: none">• Chart Paper,• Color pens	1

1 5	Carry Out Service	Self Diagnosing the faults and preparation for repair	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> • Take responsibility for completing one's own work assignment. • Complete the assigned tasks with minimum supervision. • Complete the job within timelines and quality norms. • Take initiative to enhance/learn skills in one's area of work. 	MIN/N 0491 SB7, SB8 MIN/N 0492 SB7, SB8	• Lecture	• Projector • Laptop	5
					• Practice by doing	• Chart Paper • Color pens	2
1 6	Carry out Service	Engine	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> • Explain the basic technology used in and functioning of various components and aggregates of the vehicle including - <ul style="list-style-type: none"> ✓ Engines and fuel system (diesel, petrol, electrical etc.) ✓ cooling system and coolant ✓ air supply systems ✓ emission and exhaust system ✓ ignition systems • Check routine service components and materials, including filters, drive, belts, lubricants and fluids. • Use intuition to detect any potential problems which could arise. 	MIN/N 0492 KC1, KC3, PC4, SB5 MIN/N 0491 PC7, KC1, SB5	• Lecture • Question based Learning	• Projector • Laptop	2
					• OJT • Practice by doing	• HEMM • Engine Simulator • Engine Cut Model	6
1 7	Carry out Service	Transmission System	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> • Identify clutch assembly & its functionality. • Identify gear assembly & its functionality. • Operate the clutch operating system, gearbox (manual and automatic). • Explain the drivelines and hubs, drive-train assembly. • Discuss transmission systems (manual, automatic etc.). 	MIN/N 0492 KC1, KC3, PC4 MIN/N 0491 KC1	• Instructor Led Training (ILT) • Theory	• Projector • Laptop	2
					• OJT • Field Visit	• Dumper having complete transmission • Tool Box • 10 ton crane • Ropes, slings, towing lifting Jack	6

1 8	Carry out Service	Electrical System	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> • Discuss batteries and power storage system. • Explain power-generating/transmission systems (including charging and interlocking systems). • Identify electrical wire harness, lighting, ignition, electronic and air conditioning systems etc. • Recognize electronic systems including active and passive safety, media and other systems. • Describe the electronic control unit 	MIN/N 0492 KC1, KC3 MIN/N 0491 KC1	<ul style="list-style-type: none"> • Instructor Led Training (ILT) • Lecture 	<ul style="list-style-type: none"> • Projector • Laptop 	2
					<ul style="list-style-type: none"> • Practical by doing 	<ul style="list-style-type: none"> • Multi meter • Battery used in dumper • Electrical Wire used in dumper • Electrical tester • Spanner 	6
1 9	Carry out Service	Pneumatic	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> • Explain air system. • Discuss working of compressors and their use. • Describe pneumatic controls on HEMM. • Demonstrate the hose pipe connection. • Explain pneumatic circuit. 	MIN/N 0492 KC1 MIN/N 0491 KC1	<ul style="list-style-type: none"> • Instructor Led Training (ILT) • Lecture 	<ul style="list-style-type: none"> • Projector • Laptop 	2
					<ul style="list-style-type: none"> • Practical by doing • OJT 	<ul style="list-style-type: none"> • Rotary Screw Air Compressors • Reciprocating Air Compressors • Pneumatic wrenches • Tool Box 	6

20	Carry out Service	Hydraulic	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> • Explain the theory of hydraulic and Hydraulic systems. • Explain the various types of pumps and control valves. • Understand the Hydraulic Circuit in a HEMM. • Understand the assembly of hydraulic pumps. 	MIN/N 0492 KC1 MIN/N 0491 KC1	<ul style="list-style-type: none"> • Instructor Led Training (ILT) • Theory 	<ul style="list-style-type: none"> • Projector • Laptop 	2
					<ul style="list-style-type: none"> • Field Visit • Practice by doing 	<ul style="list-style-type: none"> • Hydraulic pumps • Hydraulic simulator • Service Manual 	6
21	Carry out Service	Hydraulic	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> • Read information documents. • Identify and interpret symbols and measurements. • Service, diagnose and repair faults in mechanical systems such as gears, steering systems, hydraulic pumps, transmission etc. • Diagnose, troubleshoot and repair of hydraulic pumps and control valves. 	MIN/N 0492 KC1 MIN/N 0491 SA3, SA4	<ul style="list-style-type: none"> • Instructor Led Training (ILT) 	<ul style="list-style-type: none"> • Projector • Laptop 	2
					<ul style="list-style-type: none"> • Practical Training • OJT 	<ul style="list-style-type: none"> • Hydraulic pumps • Tool Box • Hydraulic pumps 	6
22	Carry out Service	Case Study on Various Breakdown	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> • Dismantle specific components and assemblies to identify faults. • Identify possible ways to improve efficiency and productivity of machines. • Apply theoretical understanding to symptoms and measured readings to identify the root of the problem. • Use common sense and make judgments during day to day basis. • Use reasoning skills to identify and resolve basic problems. • Use intuition to detect any potential problems which could arise. 	MIN/N 0491 PC10 MIN/N 0491 KC1	<ul style="list-style-type: none"> • Experience Sharing 	<ul style="list-style-type: none"> • Projector • Laptop 	2
					<ul style="list-style-type: none"> • Field Visit • Group Discussion 	<ul style="list-style-type: none"> • Color pens • Chart Paper • Dumper 	4

2 3	Carry Out Service	Steering Systems & Troubleshooting	<p>At the end of the session, the learner will be able to –</p> <ul style="list-style-type: none"> • Troubleshoot and repair. • Explain steering systems and various linkages in mine trucks. • Describe steering systems in excavators and linkage with crawlers. • Explain crawlers - construction and operation. 	MIN/N 0491 KC1 MIN/N 0492 KC1	<ul style="list-style-type: none"> • Instructor Led Training (ILT) • Lecture 	<ul style="list-style-type: none"> • Projector • Laptop 	2
					<ul style="list-style-type: none"> • Practical Demonstration 	<ul style="list-style-type: none"> • Model of Steering systems • Dumper with proper Steering systems • Tool Box • 10 ton crane 	6
2 4	Carry Out Service	Troubleshooting Transmission System	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> • Repair and overhaul electronic and manual and power shift transmissions. • Monitor the condition and performance of equipment using condition monitoring tools. 	MIN/N 0491 KC1	<ul style="list-style-type: none"> • Instructor Led Training (ILT) • Lecture 	<ul style="list-style-type: none"> • Projector • Laptop • SOP For Troubleshooting 	2
					<ul style="list-style-type: none"> • Practical Training 	<ul style="list-style-type: none"> • Working model of Transmission system • Tool Box • 10 ton crane 	6
2 5	Carry Out	Troubleshooting Braking System	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> • Explain the Principle Of Braking. • Identify braking system components. 	MIN/N 0491 KC1	<ul style="list-style-type: none"> • Question based 	<ul style="list-style-type: none"> • Projector • Laptop • Sop for 	2

			<ul style="list-style-type: none"> • Troubleshooting braking system. • Identify and change components requiring change due to continuous wear and tear. • Oil and air filters. • Maintain drive & drive belts. • Explain braking system. 	MIN/N 0492 KC1, PC5	Training <ul style="list-style-type: none"> • Lecture 	braking system	
					<ul style="list-style-type: none"> • On Job Training • Field Visit 	<ul style="list-style-type: none"> • Old HEMM OR Break system working model • Tool Box 	6
26	Carry Out Service	Engine Trouble Shooting	<p><i>At the end of the session, the learner will be able to -</i></p> <ul style="list-style-type: none"> • Check and make adjustments to clearances, gaps, settings, alignment, pressures, tension, speeds and levels relevant to the engine area. • List the typical causes and symptoms of operational faults and failures of a vehicle corrective action to be taken for common engine and aggregate. • Recognize system faults and failures. • Fine tune and adjust valves, belt tensions for optimal operation. 	MIN/N 0492 KC6, PC4 MIN/N 0491 PC6	<ul style="list-style-type: none"> • Field Visit • Practical Training 	<ul style="list-style-type: none"> • Tool box • Cut piece of engine modal • Dumper engine • Sop For Engine Trouble Shooting 	8 hrs
27	Carry Out Service	Suspension System	<p><i>At the end of the session, the learner will be able to –</i></p> <ul style="list-style-type: none"> • Explain Principle of the Suspension System • Recognize the components of the Suspension System • Initiate preventive Measures like - <ol style="list-style-type: none"> 1. Pitching Rolling and Bouncing 2. Spring Camber 3. Yawing 4. Dipping 5. Bottoming 6. Un-sprung Weight 7. Soft Suspension 8. Hard Suspension 	MIN/N 0492 KC1	<ul style="list-style-type: none"> • Question based Training 	<ul style="list-style-type: none"> • Projector • Laptop 	1
					<ul style="list-style-type: none"> • Practical Training • Field visit 	<ul style="list-style-type: none"> • Tool box • Suspension Modal Or Any HEMM 	7

28	Carry Out Service and Repairs of Engine and Aggregates	Various Measuring Instruments	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> • Use various measuring and testing instruments and record readings • Use tools used to assess and confirm technical faults that cannot be determined through a visual inspection, including : <ul style="list-style-type: none"> ✓ Pressure indicators: fuel pressure testers, manifold gauge sets, oil pressure gauges, tire pressure gauges ✓ Measuring equipment: Vernier calipers, micrometer, feeler gauges, multi-meter, flow meter, temp gauge, dial gauge etc. 	MIN/N 0492 KC2	<ul style="list-style-type: none"> • Instructor Led Training (ILT) • Practical Training • OJT 	<ul style="list-style-type: none"> • Projector • Laptop • Air gauge • Tool box • Vernier callipers • Micro meter • Feeler gauge • Flow meter • Temp gauge • Dial gauge 	2
		Oral Communication (Listening and Speaking skills)	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> • Effectively Communicate with supervisors and peers in a proper manner adhering to the values of respect for individual. • Discuss task lists, schedules and maintenance activities. • Listen with full attention and comprehend the information. 	MIN/N 0491 SA6, SA7, SA8 MIN/N 0492 SA6, SA7, SA8	<ul style="list-style-type: none"> • Instructor Led Training (ILT) • Think Pair Share • Training games 	<ul style="list-style-type: none"> • Projector • Laptop • Chart Paper • Color pens 	2
		Final Testing	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> • Test repaired equipment to ensure everything is working correctly and safely. • Test assembled machine for proper performance before handing over for operations. 	MIN/N 0491 PC5	<ul style="list-style-type: none"> • Practice by doing • OJT 	<ul style="list-style-type: none"> • Open area for test driving • Any HEMM - Dumper Or Excavator 	8

3 1		Occupational Health	<p>At the end of the session, the learner will be able to –</p> <ul style="list-style-type: none"> • Comply with occupational health and safety regulations adopted by the employer. • Follow mining operations procedures with respect to materials handling and accidents. • Wear safety gears such as helmet, respiratory protection, and eye and ear protection. 	MIN/N 0901 PC1, PC2, PC10	<ul style="list-style-type: none"> • Instructor Led Training (ILT) • Lecture 	<ul style="list-style-type: none"> • Projector • Laptop 	2
					<ul style="list-style-type: none"> • Visit of Rescue room 	<ul style="list-style-type: none"> • Safety Helmet • Respiratory Protection • Goggles 	3
3 2		Major and Common Mine Accidents/ Mistakes	<p>At the end of the session, the learner will be able to –</p> <ul style="list-style-type: none"> • Follow correct safety steps in case of major accident, major failure. • Work responsibly and as safe and careful as possible so as not to put the health and safety of self or others at risk, including members of the public. • Identify characteristics of post-blast fumes and take necessary precautions. • Deal with misfires as per statutory requirement. • Wears safety gear such as hard hat, respiratory protection, eye protection, ear protection. • List out mining safety procedures. • Evaluate the impact of violation of safety procedures. • Describe the environmental impact of mining. • Explain the precautions to be taken when handling heavy equipment. 	MIN/N 0491 KA6, KA7, KA8, KA9 MIN/N 0492 KA8, KA9 MIN/N 091 PC3, PC6, PC8, PC9, PC10	<ul style="list-style-type: none"> • Instructor Led Training (ILT) • Theory 	<ul style="list-style-type: none"> • Projector • Laptop 	2
					<ul style="list-style-type: none"> • Field visit • Practice by doing 	<ul style="list-style-type: none"> • Gloves, Safety • Shoes, Safety • Goggles • Safety helmet 	3
3 3	Health and Safety	Disaster Management	<p>At the end of the session, the learner will be able to –</p> <ul style="list-style-type: none"> • Recall the safety policy of the company. • Make decisions in emergency conditions. • Follow the locally prepared emergency response/ disaster management plan. • Participate in mock drill of disaster management plan. 	MIN/N 0901 KA8, KA9 MIN/N 0491 KB7, SB11	<ul style="list-style-type: none"> • Instructor Led Training (ILT) • Lecture 	<ul style="list-style-type: none"> • Projector • Disaster Plan • Laptop 	2

			<ul style="list-style-type: none"> Describe the environmental impact of mining. 	MIN/N 0492 KB9, SB11	<ul style="list-style-type: none"> Practical Demonstration Mock rehearsal 	<ul style="list-style-type: none"> Disaster management plan Open space for mock drill 	5
34	Health and Safety	Use of Fire Extinguisher	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> Classify different types of fire. Operate various grades of fire extinguishers. Control different types of fire. D reasons of mine fires. Comply with safety regulations and procedures in case of fire hazard. 	MIN/N 0901 PC4, PC5	<ul style="list-style-type: none"> Instructor Led Training (ILT) 	<ul style="list-style-type: none"> Projector Laptop 	2
					<ul style="list-style-type: none"> Practical Training 	<ul style="list-style-type: none"> Various types of fire extinguishers use – ABC Types Sand Water Bucket 	5
35	Health and Safety	First Aid	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> Demonstrate proper First Aid procedures to an injured person. Explain First aid and hygiene. 	MIN/N 0901 KA2	<ul style="list-style-type: none"> Instructor Led Training (ILT) 	<ul style="list-style-type: none"> Projector Laptop 	2
					<ul style="list-style-type: none"> Demonstration 	<ul style="list-style-type: none"> First Aid Box 	2
36	Health and Safety	Knowledge of Safety Guidelines Specified by	<p>At the end of the session, the learner will be able to -</p> <ul style="list-style-type: none"> Describe Shot-firing and Safety regulations - how and where to take shelter. Dispose off replaced components in accordance with safety, health and 	MIN/N 0492 KA5, KC8, PC6 MIN/N 0901	<ul style="list-style-type: none"> Instructor Led Training (ILT) Theory 	<ul style="list-style-type: none"> Projector Laptop Safety Guidelines 	2

		Director General of Mine Safety (DGMS)	environmental policies and regulations of organization. • Handle Hazardous material safely and security rules and regulations as prescribed by DGMS. • Follow Code of practice for safe handling and transport of dangerous material and heavy equipment. • Perform storage and transport of hazardous materials compliant with safety guidelines prescribed by DGMS.	PC7, KA5, KA11, KA12	• Mine Visit-Haulage rooms, Winding rooms	• Haulage rooms, Winding rooms, Boilers	2
					Total	Total Hours: 210 Practical: 150 Theory: 60	

Annexure II

Criteria For Assessment Of Trainees

Job Role HEMM Mechanic

Qualification Pack MIN/Q 0433

Sector Skill Council Skill Council for Mining Sector

Guidelines for Assessment

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC
3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria
5. To pass the Qualification Pack, every trainee should score a minimum of 50% in every NOS
6. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack

				Marks Allocation	
		Total Mark (100)	Out Of	Theory	Skills Practical
1. MIN/N 0491(Diagnose HEMM for repair requirements)	PC1. Conduct scheduled, routine examination methods and assessments against vehicle specifications to identify damage, corrosion, inadequate fluid levels, leaks, wear, security problems and general condition and serviceability	35	4	1	3
	PC2. Review complaint sheet and understand repair requirements		3	1	2

	PC3. Understand original equipment manufacturers' specifications and follow standard operating procedure set out for diagnosing faults		3	1	2
	PC4. Use diagnostic procedures as defined in the troubleshooting checklist prepared by the equipment manufacturer		3	1	2
	PC5. Use diagnostic tools as required to assess the problem, this includes using on board diagnostic computer to attain vehicle data and compare the same with standard output to detect faults in the system		3	1	2
	PC6. check and make adjustments to clearances, gaps, settings, alignment, pressures, tension ,speeds and levels relevant to the engine area, transmission area, chassis area, electrical area and body (including to valves, ignition, fuel and emissions, brakes, transmission, lights, tires, steering and body fittings).		3	1	2
	PC7. Check routine service components and materials, including filters, drive, belts, wiper blades, brake linings and pads, lubricants and fluids.		3	1	2
	PC8. recognize cosmetic damage to vehicle components and units outside normal service items		3	1	2
	PC9. Check lubricant levels and identify codes and grades of lubricants to be used for specific components of HEMM		3	1	2
	PC10. Dismantle specific components and assemblies to identify faults		4	1	3
	PC11. Report malfunctions or repair requirements observed in vehicles beyond what is mentioned in the complaint sheet		3	1	2
		Total	35	11	24

2. MIN/N 0492(Carry out service, repair and maintenance activities)	PC1. ensure OEM recommended procedure and checklist is followed for routine servicing	35	5	1	4
	PC2. in case of non-routine service or repair, confirm tasks to be carried out with superior		5	1	4
	PC3. Ensure that the correct spare parts, lubricants, tools and other materials required have been obtained		5	2	3
	PC4. calibrate, align and adjust settings, alignment, pressures, tension, speeds and levels relevant to: <ul style="list-style-type: none"> • engine and aggregates • transmission system • load bearing arms and structure • Safety devices and components installed • electrical and electronic components • other components (including to valves, ignition, fuel and emissions, brakes, transmission, lights, tires, steering and body fittings) 		5	2	3
	PC5. Identify and change components requiring change due to continuous wear and tear including: <ul style="list-style-type: none"> • oil and air filters • drive belts • braking system • drive 		5	2	3
	PC6. ensure disposal of materials in accordance with the organization's policies		5	1	4
	PC7. refill correct grade of coolants, lubricants and other fluids as per OEM		5	1	4
		Total	35	10	15
3. MIN / N 0901 (Health and Safety)	PC1. Comply with occupational health and safety regulations adopted by the employer.	30	3	1	2
	PC2. Follow mining operations procedures with respect to materials handling and accidents		3	1	2

	PC3. Follow the correct safety steps in case of accident or major failure		3	1	2
	PC4. Comply with safety regulations and procedures in case of fire hazard.		3	1	2
	PC5. Operate various grades of fire extinguishers.		3	1	2
	PC6. Work responsibly and as safe and careful as possible so as not to put the health and safety of self or others at risk, including members of the public		2	0	2
	PC7. Perform storage and transport of hazardous materials compliant with safety guidelines prescribed by DGMS.		2	0	2
	PC8. Deal with misfires as per statutory requirement		2	1	1
	PC9. Identify characteristics of post-blast fumes and take necessary precautions.		3	1	2
	PC10. Wears safety gear such as hard hat, respiratory protection, eye protection, ear protection		3	1	2
	PC11. Follow the manufacturer's instructions for care and safe operation of the equipment.		3	1	2
		Total	30	9	21

Notes

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