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# HEAVY MACHINE OPERATOR



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## TRAINER GUIDE

National Vocational Certificate Level 2

Version 1 - November, 2019



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## Introduction

Competency based training helps to bridge the gap between what is taught in training and what tasks will be performed on the job. Training trainees to perform actual job functions helps to ensure that future front-line workers have the skills, knowledge and abilities required to perform their jobs properly, safely and effectively. In addition to competence-based training, assessment based on the performance of actual work competencies helps to ensure that:

- trainees are performing their work tasks as safely as possible
- performance gaps are recognized prior to serious incidents
- training can be implemented to improve competence.

There are significant benefits to competence-based training:

### 1. Cost effectiveness

Since training activities and assessments in a competence-based approach are goal-oriented, trainers focus on clearly defined areas of skills, knowledge and understanding that their own industry has defined in the competence standards. At the same time, trainees are more motivated to learn when they realize the benefits of improved performance.

### 2. Efficiency

The transfer gap between the training environment and working on the job is reduced substantially in a competence-based approach. This is because training and assessment are relevant to what needs to be done on the job. As a result, it takes less time for trainees to become competent in the required areas. This, in turn, contributes to improved efficiency where training and assessment are concerned.

### 3. Increased productivity

When trainees become competent in the competence standards that their own industry has defined, when they know what the performance expectations are and receive recognition for their abilities through successful assessments, they are likely to be more motivated and experience higher job satisfaction. The result is improved productivity for organizations. The communication and constructive feedback between future employers and employees will improve as a result of a competence-based approach, which can also increase productivity.

### 4. Reduced risk

Using a competence-based approach to training, development, and assessment, employers are able to create project teams of people with complementary skills. A trainee's record of the skills, knowledge and understanding relating to the competence standards they have achieved can be used by a future employer to identify and provide further relevant training and assessment for new skills areas. Competence standards can shape employee development and promotional paths within an organization and give employees the opportunity to learn more competencies beyond their roles. It can also provide organizations with greater ability to scale and flex as needed, thereby reducing the risk they face.

## 5. Increased customer satisfaction

Employees who have been trained and assessed using a competence-based approach are, by the definition of the relevant competence standards, able to perform the required tasks associated with a job. The knock-on effect is that, in service-related industries, they are able to provide high service levels, thereby increasing customer satisfaction. In production or manufacturing industries, they are able to work closely to industry standards in a more effective and efficient way.

### Lesson plans

This manual provides a series of lesson plans that will guide delivery of each module for the Heavy Machinery Operator qualification. It is important for trainers to be flexible and be ready to adapt lesson plans to suit the context of the subject and the needs of their trainees.

Good teachers acknowledge that CBT means each and every trainee in the class learns at a different speed. The good teacher is prepared to throw aside the day's lesson plan and do something different (and unplanned) for the class even if it means 'writing' a lesson plan for each trainee to match their learning pace for that day or week.

Learning by doing is different from learning theory and then applying it. To learn to do something, trainees need someone looking over their shoulder saying 'it's not quite like that, it's like this', 'you do it like this because ...', or even 'tell me why you chose to do it like this?'

In this way, trainees learn that theoretical knowledge is meaningless if it is not seen in the context of what they are doing. In other words, if a trainee doesn't know why they do something, they will not do it competently (skills underpinned by knowledge = competent performer).

This is how a Heavy Machinery Operator acquires a practical grasp of the standards expected. It's not by learning it in theory, but because those standards are acquired through correction by people who show what the standards are, and correct the trainee where they do not meet those standards, and where they repeat it correction until they have internalized those standards.

### Demonstration of skill

Demonstration or modeling a skill is a powerful tool, which is used, in vocational training. The instructions for trainers for demonstration are as under:

- a) Read the procedure mentioned in the Trainer Guide for the relevant Learning Unit before demonstration.
- b) Arrange all tools, equipment and consumable material, which are required for demonstration of a skill.
- c) Practice the skill before demonstration to trainees, if possible.
- d) Introduce the skill to trainees clearly at the commencement of demonstration.
- e) Explain how the skill relates to the skill(s) already acquired and describe the expected results or show the objects to trainees.
- f) Carry out demonstration in a way that can be seen by all trainees.
- g) Use the same tools and materials that the learner will be using.
- h) Go through EACH of the steps involved in performing the skill.
- i) Go SLOWLY - describe each step as it is completed.
- j) Encourage the learners to move around and watch what you are doing from a number of different angles.
- k) Identify critical or complex steps, or steps that involve safety precautions to be followed.

- l) Explain theoretical knowledge where applicable and ask questions to trainees to test their understanding.
- m) Try to involve the learners: Ask them questions about why they think the process may work that way.
- n) Repeat critical steps in demonstration, if required.
- o) Summarize the demonstration by asking questions to trainees.

Involvement in the process (actively seeing) is important at this stage. When you work on getting involved, getting people to participate, you make them a part of what is happening. Questions for clarification or explanation are important throughout the demonstration. It is up to the learners to ask questions about things they do not understand, but it is also important for trainers to seek out and elicit questions from learners. A trainer may need to do repeated demonstrations of difficult or complex skills.

Remember that the learner will learn a lot from your demonstration - and not just the demonstration itself. Learners will learn about how to perform the skills, but they will also learn from watching demonstrations how trainers treat the tools or materials and how they follow safety procedures.

After the demonstration, it is important to again seek out questions - be sure all questions are answered. The trainer should ask the learner if they are ready to try the skill. If not, there may be a need for recycling the demonstration (or part of it), and clarifying some of the information.

## Overview of the program

**Course:** Level 2 Heavy Machinery Operator

**Total Course Duration:** 410 Hours...

### Course Overview:

In order to build the capacity of technical and vocational training institutes in Pakistan through provision of demand driven competency-based trainings in construction sector the NAVTTC, and TEVT Sector Support Program (TSSP) have joined hands together to develop Training courses for construction sector. These trainings will not only build the capacity of existing workers of this sector but also support the youth to acquire skills best fit for this sector. The benefits and impact of development of these training courses will be on both demand and supply side.

Based upon this demand of industry these competency-based trainings for Heavy Machine Operator are developed under National Vocational Qualification Framework (NVQF) (Level 1 to 4). The training courses mainly cover competencies along with related knowledge and professional skills which are essential for getting a job or self-employed.

The training courses are also in line with the vision of Pakistan's National Skills Strategy (NSS), National TVET Policy and National Vocational Qualification Framework (NVQF). This provides policy directions, support and an enabling environment to the public and private sectors to impart training for skills development to enhance social and economic profile.

The purpose of the training is to provide skilled manpower to improve the existing capacity of construction sector. This training will provide the requisite skills to the trainees to operate Heavy Machines. It will enable the participants to meet the challenges in the field of construction industry. Further, to improve the skill level of the Operators and prepare them for the construction industry to meet the market competition nationally and internationally. The core purpose of this qualification is to produce employable Heavy Machine Operators who could operate Heavy Machines according to national and international standards. In addition, this qualification will prepare unemployable youth to employee in construction sector.



## List of Modules

Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of Modules
<p><b>Module A:</b> <b>Comply Personal Health and Safety Guidelines</b></p> <p><b>Aim:</b> This Competency Standard identifies the competencies required to protect/apply occupational Safety, Health and Environment at workplace according to the industry's approved guidelines, procedures and interprets environmental rules/regulations. Trainee will be expected to identify and use Personal Protective Equipment (PPE) according to the work place requirements. The underpinning knowledge regarding Observe Occupational Safety and Health (OSH) will be sufficient to provide the basis for the job at workplace.</p>	<p><b>LU1:</b> Identify Personal Hazards at work place</p> <p><b>LU2:</b> Apply personal protective and safety equipment (PPE)</p> <p><b>LU3:</b> Comply with occupational safety and health (OSH)</p> <p><b>LU4:</b> Dispose of hazardous waste/materials from the designated area</p>	<b>06</b>	<b>24</b>	<b>30</b>
<p><b>Module B:</b> <b>Communicate the Workplace Policy and Procedure</b></p> <p><b>Aim:</b> This unit describes the performance outcomes, skills and knowledge required to develop communication skills in the workplace. It covers gathering, conveying and receiving information, along with completing assigned written information under direct supervision.</p>	<p><b>LU1.</b> Identify workplace communication procedures</p> <p><b>LU2.</b> Communicate at workplace</p> <p><b>LU3.</b> Draft Written Information</p> <p><b>LU4.</b> Review Documents</p>	<b>04</b>	<b>16</b>	<b>20</b>
<p><b>Module C:</b> <b>Perform Basic Communication (Specific)</b></p> <p><b>Aim:</b> This unit describes the skills and knowledge required to assist in the development of</p>	<p><b>LU1.</b> Communicate in a team to achieve intended outcomes</p> <p><b>LU2.</b> Follow Supervisor's instructions as per</p>	<b>06</b>	<b>24</b>	<b>30</b>

communication competence by providing information regarding different forms of communication and their appropriate use.	organizational SOPs <b>LU3.</b> Develop Generic communication skills at workplace			
<b>Module D:</b> <b>Perform Basic Computer Application (Specific)</b> <b>Aim:</b> This unit describes the skills and knowledge required to use spreadsheet to prepare a page of document, develops familiarity with Word, Excel, email, and computer graphics basics.	<b>LU1.</b> Create Word Documents <b>LU2.</b> Create Excel Documents <b>LU3.</b> Use internet for Browsing	<b>08</b>	<b>32</b>	<b>40</b>
<b>Module E:</b> <b>Maintain Machine (with Engine Off)</b>  <b>Aim:</b> This module covers the skills and knowledge required to Inspect and service lubrication system, Inspect and service electrical system, Inspect and service hydraulic system, Inspect and service cooling system, Inspect and service air intake system, Inspect and service fuel system, Inspect and service suspension system, Inspect and service drive train, Inspect and service braking system, Inspect and service load bearing structure, Inspect and service operator station/cab, Inspect safety equipment, Inspect and service attachments and Inspect and service supporting pneumatic (air-filled) system	<b>LU-1:</b> Inspect and Service of lubrication system <b>LU-2:</b> Inspect and Service electrical system <b>LU-3:</b> Inspect and Service hydraulic system <b>LU-4:</b> Inspect and Service cooling system <b>LU-5:</b> Inspect and Service of air intake system <b>LU-6:</b> Inspect and Service of fuel system <b>LU-7:</b> Inspect and Service of suspension system <b>LU-8:</b> Inspect and Service of drive train <b>LU-9:</b> Inspect and Service of braking system <b>LU-10:</b> Inspect and Service of load bearing structure <b>LU-11:</b> Inspect and Service of operator station/Cab <b>LU-12:</b> Inspect Equipment safety <b>LU-13:</b> Inspect and Service of attachments <b>LU-14:</b> Inspect and Service of supporting pneumatic (Air-filled) system	<b>40</b>	<b>160</b>	<b>200</b>
<b>Module F:</b> <b>Maintain Machine (with Engine Running)</b> <b>Aim:</b> This module covers the skills and knowledge required to Start engine monitor warning systems, Warm up engine, Cycle equipment functions, comply with scheduled maintenance requirements and Maintain Logbook	<b>LU-1:</b> Monitor warning systems <b>LU-2:</b> Warm up engine <b>LU-3:</b> Cycle equipment functions <b>LU-4:</b> Scheduled Maintenance Requirements <b>LU-5:</b> Logbook	<b>08</b>	<b>32</b>	<b>40</b>

<p><b>Module G: Park Machines</b></p> <p><b>Aim:</b> This module covers the skills and knowledge required to Clean under carriage and attachments before parking, Park equipment in appropriate location, shut down and secure equipment, perform housekeeping tasks and Perform visual inspection.</p>	<p><b>LU-1:</b> Clean under carriage and attachments before parking  <b>LU-2:</b> Park equipment in appropriate location  <b>LU-3:</b> Shut down and secure equipment  <b>LU-4:</b> Housekeeping tasks  <b>LU-5:</b> Visual inspection</p>	<b>10</b>	<b>40</b>	<b>50</b>
<b>TOTAL</b>		<b>82</b>	<b>328</b>	<b>410</b>

## Lesson Plan Module E

**Module E:**

**Maintain Machine (with Engine Off)**

**Learning Unit:**

**LU-1: Inspect and service lubrication system**

**LU-2: Inspect and service electrical system**

**LU-3: Inspect and service hydraulic system**

**LU-4: Inspect and service cooling system**

**LU-5: Inspect and service fuel system**

**LU-6: Inspect and service air intake system**

**LU-7: Inspect and service suspension system**

**LU-8: Inspect and service drive train**

**LU-9: Inspect and service braking system**

**LU-10: Inspect and service load bearing structure**

**LU-11: Inspect and service operator station/Cab**

**LU-12: Inspect safety equipment**

**LU-13: Inspect and service attachments**

**LU-14: Inspect and service supporting pneumatic (Air-filled) system**

**Learning Outcomes:**

Trainee will be able to understand the SOPs for maintaining the machine with Engine off, trainees will get knowledge and skills for inspection and service of electrical system, hydraulic system, cooling system, fuel system, air intake system, suspension system, drive train, braking system, load bearing structure, operator station/Cab, safety equipment, attachments, supporting pneumatic (Air-filled) system

Methods:	Key Notes:	Media:	Time:
Through Multimedia Presentations and Practical	The knowledge of electrical system, hydraulic system, cooling system, fuel system, air intake system, suspension system, drive train, braking system, load bearing structure,	Multimedia and physical heavy machinery (Bull Dozer, Wheel Loader, Excavator, Grader)	200 hours

operator station/Cab, safety equipment, attachments, supporting pneumatic (Air-filled) system
<b>Introduction</b>
Introduction to the concept of Maintenance of Heavy Machines, Principals of Maintenance with Engine Off
<b>Main Body</b>
<ul style="list-style-type: none"> <li>□ Explain the concept of Maintenance of Heavy Machines, its significance, importance, common international principals and its advantages. Differentiate between preventive maintenance and Corrective maintenance principals and the importance of preventive maintenance. Hazards and risks of not doing proper maintenance of heavy machines. Explain the stages of maintenance</li> <li>□ Explain the SOPs for maintenance when the engine is off. Physically take the trainees to the Machine and make them visually observe and note the components which require maintenance. Arrange trainees in a group of 04 trainees and make them perform the maintenance routine. Note down the mistakes of trainees and explain them jointly after the practical session</li> </ul>
<b>Conclusion</b>
Summarize the lessons and arrange a formative assessment of both theoretical and practical nature.
<b><u>Assessment</u></b>
Ask questions about previous lesson and ask learners to practically perform the task
<b>Total time:</b>

## Lesson Plan Module F

**Module F:  
Maintain Machine (with Engine Runing)**

**Learning Unit:**  
**LU-1: Start engine monitor warning systems**  
**LU-2: Warm up engine**  
**LU-3: Cycle equipment functions**  
**LU-4: Comply with Scheduled Maintenance Requirements**  
**LU-5: Maintain Logbook**

**Learning Outcomes:**  
**Trainee will be able to understand the SOPs for maintaining the machine with Engine running, engine monitor warning systems, Warm up engine, Cycle equipment functions, Comply with Scheduled Maintenance Requirements, Maintain Logbook**

Methods:	Key Notes:	Media:	Time:
Through Multimedia Presentations and Practical	The knowledge of maintaining the machine with Engine running, engine monitor warning systems, Warm up engine, Cycle equipment functions, Comply with Scheduled Maintenance Requirements, Maintain Logbook	Multimedia and physical heavy machinery (Bull Dozer, Wheel Loader, Excavator, Grader)	40 hours

### Introduction

Introduction to The Concept of Maintenance of Heavy Machines, Principals of Maintenance with Engine Running

### Main Body

- Explain the concept of Maintenance of Heavy Machines, its significance, importance, common international principals and its advantages. Differentiate between preventive maintenance and Corrective maintenance principals and the importance

of preventive maintenance. Hazards and risks of not doing proper maintenance of heavy machines. Explain the stages of maintenance

- Explain the SOPs for maintenance when the engine is on. Physically take the trainees to the Machine and make them visually observe and note the components which require maintenance. Arrange trainees in a group of 04 trainees and make them perform the maintenance routine. Note down the mistakes of trainees and explain them jointly after the practical session

### **Conclusion**

Summarize the lessons and arrange a formative assessment of both theoretical and practical nature.

### **Assessment**

Ask questions about previous lesson and ask learners to practically perform the task

**Total time:**

## Lesson Plan Module G

**Module G:  
Park Machines**

**Learning Unit:**

**LU-1: Clean under carriage and attachments before parking**

**LU-2: Park equipment in appropriate location**

**LU-3: Shut down and secure equipment**

**LU-4: Perform housekeeping tasks**

**LU-5: Perform visual inspection**

**Learning Outcomes:**

**Trainee will be able to understand the SOPs for Cleaning under carriage and attachments before parking, Park equipment in appropriate location, shut down and secure equipment, perform housekeeping tasks, Perform visual inspection**

Methods:	Key Notes:	Media:	Time:
Through Multimedia Presentations and Practical	The knowledge of Cleaning under carriage and attachments before parking, Park equipment in appropriate location, shut down and secure equipment, perform housekeeping tasks, Perform visual inspection	Multimedia and physical heavy machinery (Bull Dozer, Wheel Loader, Excavator, Grader)	50 hours

**Introduction**

Introduction to The Concept of Maintenance of Heavy Machines, Principals of Parking the Machinery appropriately

**Main Body**

- The SOPs for Parking the Machinery, its significance and international best practices. Physically take the trainees to the parking area and make them visually observe the SOPs real time.

**Conclusion**



Summarize the lessons and arrange a formative assessment of both theoretical and practical nature.

**Assessment**

Ask questions about previous lesson and ask learners to practically perform the task

**Total time:**

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Module-E

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## Module E: Maintain Machine (with Engine Off)

Learning Unit	Suggested Teaching/ Learning Activities	Delivery Context	Media
<p><b>LU1.</b> Inspect and Service Lubrication System</p>	<p>Begin the session through an illustrative presentation. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ul style="list-style-type: none"> <li>• Explain the concept of Maintenance of Heavy Machines, its significance, importance, common international principals and its advantages.</li> <li>• Differentiate between preventive maintenance and Corrective maintenance principals and the importance of preventive maintenance.</li> <li>• Hazards and risks of not doing proper maintenance of heavy machines.</li> <li>• Explain the stages of maintenance of Heavy Machines (engine on/off, routine preventive maintenance)</li> <li>• Explain the protocols of Machinery Maintenance when engine is off and why it is necessary</li> <li>• Explain the stepwise method for performing maintenance of machine when engine is off</li> </ul> <ol style="list-style-type: none"> <li><b>1. Describe lubrication systems, their components and importance</b></li> <li><b>2. Describe state of the lubrication components</b></li> <li><b>3. Describe levels of lubricants to be maintained</b></li> <li><b>4. Identify the tools for service of lubrication system</b></li> </ol> <ul style="list-style-type: none"> <li>• Take the trainees to the Machines physically and show them the Lubrication systems of the machines like hydraulic oil system, engine oil system, fuel systems, hose pipes, drains, brake oil</li> </ul>	<p>Classroom, On site, workshop</p>	<ul style="list-style-type: none"> <li>• Multi media</li> <li>• Machines,</li> <li>• Engine oil,</li> <li>• Hydraulic oil,</li> <li>• Transmission oil,</li> <li>• Brake oil,</li> <li>• Oil filter,</li> <li>• Appropriate tools</li> </ul>

	<p>system, transmission oil system, differential oil system, greasing points, valves.</p> <ul style="list-style-type: none"> <li>• Explain the minimum level of lubricants to be maintained and explain how to read the levels of the lubricants on machine</li> <li>• Identify each and every component with its proper name and physical appearance and ask trainees to make notes.</li> </ul> <p>Make group of 04 trainees per group and ask them to identify the different lubrication system components</p> <ul style="list-style-type: none"> <li>• Identify the appropriate tools for service of different lubrication systems and make sure every trainee visually takes the record and observe tools</li> <li>• Perform service with appropriate tools and make sure every trainee is involved in the practical</li> <li>• Ask each trainee to perform service of lubrication system using the tools</li> </ul> <p>Observe the students and give feedback to Improve the Knowledge and skill.</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Inspect and Service Lubrication System in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>		
<p><b>LU3.</b> Inspect and service hydraulic system</p>	<p>Begin the session through an illustrative presentation on how to Inspect and service hydraulic system. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p>	<p>Classroom, On site, workshop</p>	<ul style="list-style-type: none"> <li>• Hydraulic oil</li> <li>• Hydraulic filter</li> <li>• Hydraulic hoses</li> <li>• Tools</li> </ul>

	<ol style="list-style-type: none"> <li>1. Describe hydraulic systems, their components and importance</li> <li>2. Describe state of the hydraulic components and explain their role</li> <li>3. Describe levels of lubricants to be maintained in hydraulic system</li> <li>4. Describe leakage and overheating of components.</li> <li>5. Explain the function of hoses and pipes and describe how to identify the leakages in them</li> <li>6. Explain the importance of carefully inspecting the hydraulic system for any leakage, damage or defect</li> <li>7. Identify the tools for service of hydraulic system <ul style="list-style-type: none"> <li>• Take the trainees to the Machines physically and show them the hydraulic systems of the machines</li> <li>• Identify each and every component with its proper name and physical appearance and ask trainees to make notes.</li> </ul> </li> </ol> <p>Make group of 04 trainees per group and ask them to identify the different components correctly</p> <ul style="list-style-type: none"> <li>• Identify the appropriate tools for service of different systems and make sure every trainee visually takes the record and observe tools</li> <li>• Perform service with appropriate tools and make sure every trainee is involved in the practical, replace leaked seal, change hydraulic oil and filter</li> </ul> <p>Ask each trainee to replace leaked seal, change hydraulic oil and filter through appropriate tools</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Inspect and service hydraulic system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>		
<p><b>LU4.</b> Inspect and service cooling system</p>	<p>Begin the session through an illustrative presentation on how to Inspect and service Cooling system. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p>	<p>Classroom, On site, workshop</p>	<ul style="list-style-type: none"> <li>• Coolant</li> <li>• Fan belt</li> <li>• Tools</li> </ul>

	<ol style="list-style-type: none"> <li>1. Describe cooling systems, their components and importance</li> <li>2. Describe state of the cooling components and explain their role</li> <li>3. Describe levels of coolant to be maintained in cooling system</li> <li>4. Explain the airflow system and its importance</li> <li>5. Identify the tools for service of cooling system <ul style="list-style-type: none"> <li>• Take the trainees to the Machines physically and show them the cooling systems of the machines</li> <li>• Identify each and every component with its proper name and physical appearance and ask trainees to make notes.</li> </ul> </li> </ol> <p>Make group of 04 trainees per group and ask them to identify the different components correctly</p> <ul style="list-style-type: none"> <li>• Identify the appropriate tools for service of different systems and make sure every trainee visually takes the record and observe tools</li> <li>• Perform service with appropriate tools and make sure every trainee is involved in the practical, replace fan belt and check for any leakages in radiator and hoses</li> </ul> <p>Ask each trainee to replace fan belt and check for any leakages in radiator and hoses</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Inspect and service Cooling system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>		
<p><b>LU5.</b> Inspect and service air intake system</p>	<p>Begin the session through an illustrative presentation on how to Inspect and service intake system. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ol style="list-style-type: none"> <li>1. Describe air in-take systems, their components and importance</li> <li>2. Describe state of the components and explain their role</li> <li>3. Describe defects in air intake system.</li> <li>4. Explain the air in-take system and its importance</li> </ol>	<p>Classroom, On site, workshop</p>	<ul style="list-style-type: none"> <li>• Air filter</li> <li>• Clamps</li> <li>• Intake hoses</li> <li>• Tools</li> </ul>

	<p><b>5. Explain the time schedule for replacement of air filter and why it is necessary</b></p> <p><b>6. Identify the tools for service of air in-take system</b></p> <ul style="list-style-type: none"> <li>• Take the trainees to the Machines physically and show them the Air intake system of the machines</li> <li>• Identify each and every component with its proper name and physical appearance and ask trainees to make notes.</li> </ul> <p>Make group of 04 trainees per group and ask them to identify the different components correctly</p> <ul style="list-style-type: none"> <li>• Identify the appropriate tools for service of system and make sure every trainee visually takes the record and observe tools</li> <li>• Perform service with appropriate tools and make sure every trainee is involved in the practical, replace air filter, clean the air filter tank and hoses for dust.</li> </ul> <p>Ask each trainee to replace air filter, clean the air filter tank and hoses for dust.</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Inspect and service intake system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>		
<p><b>LU6.</b> Inspect and service fuel system</p>	<p>Begin the session through an illustrative presentation on how to Inspect and service fuel system. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ol style="list-style-type: none"> <li><b>1. Describe fuel systems, their components and importance</b></li> <li><b>2. Describe state of the fuel system components and explain their role</b></li> <li><b>3. Explain the fuel system and its importance</b></li> <li><b>4. Describe defects in fuel system.</b></li> <li><b>5. Explain and show the fuel level gauges and how to read the</b></li> </ol>	<p>Classroom, On site, workshop</p>	<ul style="list-style-type: none"> <li>• Fuel filter</li> <li>• Fuel</li> <li>• Tools</li> <li>• Machine</li> </ul>

	<p><b>gauges</b></p> <p><b>6. Identify the tools for service of fuel system</b></p> <ul style="list-style-type: none"> <li>• Take the trainees to the Machines physically and show them the fuel system of the machines</li> <li>• Identify each and every component with its proper name and physical appearance and ask trainees to make notes.</li> </ul> <p>Make group of 04 trainees per group and ask them to identify the different components correctly</p> <ul style="list-style-type: none"> <li>• Identify the appropriate tools for service of fuel system and make sure every trainee visually takes the record and observe tools</li> <li>• Perform service with appropriate tools and make sure every trainee is involved in the practical, replace fuel filter, clean the fuel filter tank and check pipes for any leakage</li> </ul> <p>Ask each trainee to replace fuel filter, clean the fuel filter tank and check pipes for any leakage</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Inspect and service fuel system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>		
<p><b>LU7.</b> Inspect and service suspension system</p>	<p>Begin the session through an illustrative presentation. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ol style="list-style-type: none"> <li><b>1. Describe suspension systems, their components and importance</b></li> <li><b>2. Describe state of the suspension system components and explain their role</b></li> <li><b>3. Explain the suspension system and its importance</b></li> <li><b>4. Explain the parts of suspension systems like gashes, tires, bearings, bushes, pins, grease fittings</b></li> <li><b>5. Describe defects in suspension system</b></li> </ol>	<p>Classroom, On site, workshop</p>	<ul style="list-style-type: none"> <li>• Grease</li> <li>• Bushes</li> <li>• Tools</li> <li>• Machines</li> </ul>



	<p><b>6. Explain the critical components to be checked carefully while doing visual inspection of suspension system</b></p> <p><b>7. Identify the tools for service of suspension system</b></p> <ul style="list-style-type: none"> <li>• Take the trainees to the Machines physically and show them the suspension system of the machines</li> <li>• Identify each and every component with its proper name and physical appearance and ask trainees to make notes.</li> </ul> <p>Make group of 04 trainees per group and ask them to identify the different components correctly</p> <ul style="list-style-type: none"> <li>• Identify the appropriate tools for service of suspension system and make sure every trainee visually takes the record and observe tools</li> <li>• Perform service with appropriate tools and make sure every trainee is involved in the practical, check gashes, air pressure in tires, greasing points for any blockage, bearings and pins for any damage and bushes for any wear and tear.</li> </ul> <p>Ask each trainee to check gashes, air pressure in tires, greasing points for any blockage, bearings and pins for any damage and bushes for any wear and tear.</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Inspect and service suspension system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>		
<p><b>LU8.</b> Inspect and service drive train</p>	<p>Begin the session through an illustrative presentation on how to Inspect and service Drive Train system. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ol style="list-style-type: none"> <li><b>1. Describe undercarriage systems, their components and importance</b></li> <li><b>2. Describe state of the undercarriage system components and explain their role.</b></li> <li><b>3. Explain the undercarriage system and its importance</b></li> </ol>	<p>Classroom, On site, workshop</p>	<ul style="list-style-type: none"> <li>• Machines</li> <li>• Note pad</li> <li>• Inspection check list</li> <li>• Machines</li> </ul>

	<p><b>4. Explain defects in undercarriage system.</b></p> <p><b>5. Prepare a check list of visual inspection and provide to the trainees</b></p> <ul style="list-style-type: none"> <li>• Take the trainees to the Machines physically and show them the undercarriage system of the machines</li> <li>• Identify each and every component with its proper name and physical appearance and ask trainees to make notes.</li> </ul> <p>Make group of 04 trainees per group and ask them to identify the different components correctly</p> <ul style="list-style-type: none"> <li>• Perform service with appropriate tools and make sure every trainee is involved in the practical, check leaks of grease and damages to the components</li> </ul> <p>Ask each trainee to check leaks of grease and damages to the components</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Inspect and service Drive Train system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>		
<p><b>LU9.</b> Inspect and service braking system</p>	<p>Begin the session through an illustrative presentation on how to Inspect and service Braking system. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ol style="list-style-type: none"> <li><b>1. Describe braking systems, their components and importance</b></li> <li><b>2. Describe state of the braking system components and explain their role</b></li> <li><b>3. Explain the braking system and its importance</b></li> <li><b>4. Describe levels of brake oil/power oil to be maintained</b></li> <li><b>5. Prepare a check list of visual inspection and provide to the trainees</b></li> <li><b>6. Explain the critical situations while inspection like leakages of</b></li> </ol>	<p>Classroom, On site, workshop</p>	<ul style="list-style-type: none"> <li>• Brake oil</li> <li>• Tools</li> <li>• Machines</li> </ul>

	<p><b>brake oil, damaged seals or pipes</b></p> <p><b>7. Identify the tools for service of braking system</b></p> <ul style="list-style-type: none"> <li>• Take the trainees to the Machines physically and show them the braking system of the machines</li> <li>• Identify each and every component with its proper name and physical appearance and ask trainees to make notes.</li> </ul> <p>Make group of 04 trainees per group and ask them to identify the different components correctly</p> <ul style="list-style-type: none"> <li>• Perform service with appropriate tools and make sure every trainee is involved in the practical, maintain the level of brake oil, check leaks of braking oil and damages to the pipes or seals</li> </ul> <p>Ask each trainee to maintain the level of brake oil, check leaks of braking oil and damages to the pipes or seals</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Inspect and service Braking system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>		
<p><b>LU10.</b> Inspect and service load bearing structure</p>	<p>Begin the session through an illustrative presentation. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ol style="list-style-type: none"> <li><b>1. Describe load bearing systems, their components and importance</b></li> <li><b>2. Describe state of the load bearing system components and explain their role</b></li> <li><b>3. Explain the load bearing system and its importance</b></li> <li><b>4. Describe defects in Load Bearing System</b></li> <li><b>5. Prepare a check list of visual inspection and provide to the trainees</b></li> <li><b>6. Explain the critical situations while inspection like leakages of hydraulic oil, damaged seals or pipes</b></li> </ol>	<p>Classroom, On site, workshop</p>	<ul style="list-style-type: none"> <li>• Inspection check list</li> <li>• Machines</li> <li>• Grease</li> </ul>

	<p><b>7. Explain the possible defects in load bearing system</b></p> <p><b>8. Identify the tools for service of load bearing system</b></p> <ul style="list-style-type: none"> <li>• Take the trainees to the Machines physically and show them the load bearing system of the machines</li> <li>• Identify each and every component with its proper name and physical appearance and ask trainees to make notes.</li> </ul> <p>Make group of 04 trainees per group and ask them to identify the different components correctly</p> <ul style="list-style-type: none"> <li>• Perform service with appropriate tools and make sure every trainee is involved in the practical, visually inspect the load bearing system and identify for any leakages or damages</li> </ul> <p>Ask each trainee to visually inspect the load bearing system and identify for any leakages or damages</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Inspect and service Load Bearing Structure in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>		
<p><b>LU11.</b> Inspect and service operator station/cabin</p>	<p>Begin the session through an illustrative presentation on how to Inspect and service operator station/cabin. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ol style="list-style-type: none"> <li><b>1. Describe the primary components and equipment inside the operator cabin</b></li> <li><b>2. Describe every component in the operator cabin and explain their role</b></li> <li><b>3. Describe defective controls</b></li> <li><b>4. Explain the importance of cleaning front/rear wind screens, windows and side view mirrors</b></li> <li><b>5. Identify the nobs, warning lights and indicators to be checked on the instrument panel for accurate working</b></li> </ol>	<p>Classroom, On site, workshop</p>	<ul style="list-style-type: none"> <li>• Inspection check list</li> <li>• Fuses</li> <li>• Bulbs</li> <li>• Machines</li> </ul>

	<p><b>6. Describe the equipment and their storage place inside the cabin like tool kit, fire extinguisher, dusting cloth etc.</b></p> <p><b>7. Prepare a check list of visual inspection and provide to the trainees</b></p> <ul style="list-style-type: none"> <li>• Take the trainees to the Machines physically and show them the operator cabin and its components and equipment</li> <li>• Identify each and every component with its proper name and physical appearance and ask trainees to make notes.</li> </ul> <p>Make group of 04 trainees per group and ask them to identify the different components correctly</p> <ul style="list-style-type: none"> <li>• Perform service with appropriate tools and make sure every trainee is involved in the practical, replace a broken side view mirror, adjust loose seat, clean the floor for any loose material inside the cabin</li> </ul> <p>Ask each trainee to replace a broken side view mirror, adjust loose seat, clean the floor for any loose material inside the cabin</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Inspect and service operator station/cabin in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>		
<p><b>LU12.</b> Inspect safety equipment</p>	<p>Begin the session through an illustrative presentation on how to Inspect safety equipment. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ol style="list-style-type: none"> <li><b>1. Describe the primary safety equipment of the machine</b></li> <li><b>2. Explain the importance and show the safety equipment like fire extinguisher, safety belts, safety grills, safety rods on the machine</b></li> <li><b>3. Explain the process of checking the expiry of the fire extinguishers</b></li> </ol> <ul style="list-style-type: none"> <li>• Take the trainees to the Machines physically and show them the</li> </ul>	<p>Classroom, On site, workshop</p>	<ul style="list-style-type: none"> <li>• Fire extinguisher and refill material</li> <li>• Machines</li> </ul>

	<p>standard safety equipment provided with the machine</p> <ul style="list-style-type: none"> <li>Identify each and every component with its proper name and physical appearance and ask trainees to make notes.</li> </ul> <p>Make group of 04 trainees per group and ask them to identify the different components correctly</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Inspect safety equipment in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>		
<p><b>LU13.</b> Inspect and service Attachments</p>	<p>Begin the session through an illustrative presentation on how to Inspect and service attachments. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ul style="list-style-type: none"> <li><b>Recall the lesson on machine and its attachments</b></li> <li><b>Ask trainees to list down the attachments for Bull Dozer, Wheel Loader, Excavator and Grader</b></li> <li><b>Explain the use of various attachments</b></li> <li><b>Explain the methods of visual inspection of the attachments</b></li> <li><b>Explain possible damages to the attachments</b></li> </ul> <ul style="list-style-type: none"> <li>Take the trainees to the Machines physically and show them the attachments</li> <li>Identify each and every component with its proper name and physical appearance and ask trainees to make notes.</li> </ul>	<p>Classroom, On site, workshop</p>	<ul style="list-style-type: none"> <li>Jack Hammer</li> <li>Small bucket of excavator</li> <li>Grease</li> <li>Bushes</li> <li>Tools</li> </ul>

	<p>Make group of 04 trainees per group and ask them to identify the different components correctly</p> <ul style="list-style-type: none"> <li>• Perform basic maintenance of the attachments like greasing, bush replacement and pins cleaning</li> </ul> <p>Ask every trainee to Perform basic maintenance of the attachments like greasing, bush replacement and pins cleaning</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Inspect and service attachments in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>		
<p><b>LU14.</b> Inspect and service supporting pneumatic (air-filled) system</p>	<p>Begin the session through an illustrative presentation Inspect and service supporting pneumatic (air-filled) system. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ol style="list-style-type: none"> <li><b>1. Describe importance of pneumatic parts (air-filled/operated) and systems</b></li> <li><b>2. Describe defects of pneumatic parts (air-filled/operated) and systems</b></li> </ol> <ul style="list-style-type: none"> <li>• Take the trainees to the Machines physically and show them the pneumatic parts (air-filled/operated)</li> <li>• Identify each and every component with its proper name and physical appearance and ask trainees to make notes.</li> </ul> <p>Make group of 04 trainees per group and ask them to identify different components correctly</p> <ul style="list-style-type: none"> <li>• Perform basic maintenance such as choked drain valves, blocked</li> </ul>	<p>Classroom, On site, workshop</p>	<p>Machines</p>

	<p>air lines</p> <p>Ask every trainee to Perform basic maintenance such as choked drain valves, blocked air lines</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Inspect and service supporting pneumatic (air-filled) system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>		
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## Multiple Choice Questions (MCQ's)

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**Question 1** What is the lubrication system

- A It is the radiator of the machine
- Xx B It includes all hydraulic and fuel system
- C It is the system of flowing water in the machine
- D It is the system to keep machine cold

**Question 2** What is not included in the electrical system

- A The control panel of the machine
- Xx B The fuel and temperature gages
- C The headlights of the machine
- D The warning lights on the panel

**Question 3** Air filter is the part of

- Xx A Pneumatic System
- B Cooling System
- C Fuel System
- D Braking System

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**Question 4** Oil Filter is part of

- A Pneumatic System
- B Cooling System
- Xx C Fuel System
- D Braking System

**Question 5** Function of Suspension system is

- A To lift heavy loads
- B To balance the weight of the machine
- C To drive the machine
- Xx D None of the above

# HEAVY MACHINE OPERATOR



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Module-F  
TRAINER GUIDE  
National Vocational Certificate Level 2

Version 1 - November, 2019

## Module F: Maintain Machine (with Engine Running)

Learning Unit	Suggested Teaching/ Learning Activities	Delivery Context	Media
<p><b>LU1.</b> Start engine monitor warning systems</p>	<p>Begin the session through an illustrative presentation on how to Start Engine monitor warning system. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ol style="list-style-type: none"> <li><b>1. Describe basic warning lights/indicators of machine</b></li> <li><b>2. Start the machine engine. Explain and show the trainees various lights, warning signs and indicators of machine</b></li> <li><b>3. Replace fuses and tighten loose fitting.</b></li> <li><b>4. Select appropriate tools.</b></li> </ol> <ul style="list-style-type: none"> <li>• Take the trainees to the Machines physically and show them the warning lights/indicators when engine is on</li> <li>• Identify each and every component with its proper name and physical appearance and ask trainees to make notes.</li> </ul> <p>Make group of 04 trainees per group and ask them to identify the different components correctly</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Start Engine monitor warning system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>	<p>On site</p>	<ul style="list-style-type: none"> <li>• Machine</li> </ul>

<p><b>LU2.</b> Warm up engine</p>	<p>Begin the session through an illustrative presentation on how to Warm up engine. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ol style="list-style-type: none"> <li><b>1. Describe manufacturer’s standard SOPs for warming up the engine as per the machine manual</b></li> <li><b>2. Explain the standard practices for warming up the engine in cold weather and hot weather</b></li> <li><b>3. Explain the standard time for engine warm up and identify the status after the engine is warmed</b></li> </ol> <ul style="list-style-type: none"> <li>• Take the trainees to the Machines physically and show them the warning lights/indicators when engine is warming up</li> <li>• Identify each and every component with its proper name and physical appearance and ask trainees to make notes.</li> </ul> <p>Make group of 04 trainees per group and ask them to identify the different components correctly.</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Warm up Engine in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>	<p>Onsite</p>	<ul style="list-style-type: none"> <li>• Machine</li> </ul>
<p><b>LU3.</b> Cycle equipment functions</p>	<p>Begin the session through an illustrative presentation on Cycle equipment functions. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ol style="list-style-type: none"> <li><b>1. Describe in detail the cycle of engine starts and the functions of brakes, steering, lights, wipers and hydraulic functions.</b></li> <li><b>2. Identify problems with functions.</b></li> </ol> <ul style="list-style-type: none"> <li>• Take the trainees to the Machines physically and show them the warning lights/indicators when engine is warming up</li> </ul>	<p>Class room and workshop</p>	<ul style="list-style-type: none"> <li>• Machine Manufacturer manual</li> <li>• Multimedia</li> </ul>

	<ul style="list-style-type: none"> <li>Identify each and every component with its proper name and physical appearance and ask trainees to make notes.</li> </ul> <p>Make group of 04 trainees per group and ask them to identify the different components correctly</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Cycle equipment functions in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>		
<p><b>LU4.</b> Comply with scheduled maintenance requirements</p>	<p>Begin the session through an illustrative presentation on how to Comply with scheduled maintenance requirements. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ol style="list-style-type: none"> <li><b>1. Explain in detail the scheduled maintenance of Bull Dozer, Wheel Loader, Excavator and Grader as per standard practices and as per manufacturer's manual recommendations</b></li> <li><b>2. Explain in detail the identification of scheduled maintenance time from the sounds of machine</b></li> <li><b>3. Describe the maintenance routine as per manufacturer's manual for bull dozer, wheel loader, excavator and grader</b></li> <li><b>4. Explain the preventive maintenance and its step by step execution for bull dozer, wheel loader, excavator and grader</b></li> <li><b>5. Explain in detail the safety measures to adopt for scheduled maintenance activity</b> <ul style="list-style-type: none"> <li>Take the trainees to the Machines physically and show them scheduled maintenance written in the machine manual</li> <li>Identify appropriate tools for performing scheduled maintenance</li> </ul> </li> </ol>	<p>Classroom, On site</p>	<ul style="list-style-type: none"> <li>Manufacturer's Manual</li> <li>Tools</li> <li>Oil filter</li> <li>Air filter</li> <li>Lubricants of all types</li> </ul>

	<ul style="list-style-type: none"> <li>• Perform scheduled maintenance activity for all 04 machines and ask trainees to note the stepwise process and use of tools</li> <li>• Make group of 04 trainees per group and ask them to identify the different components correctly as per maintenance manual</li> <li>• Give each group a task to draw scheduled maintenance flow chart for all 04 machines</li> <li>• Ask group of trainees to perform scheduled maintenance as per manufacturers manual</li> </ul> <p>Learners must be able to practice and develop their knowledge and skills relating to Comply with scheduled maintenance requirements in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>		
<p><b>LU5.</b> Maintain Logbook</p>	<p>Begin the session through an illustrative presentation on how to Maintain Log Book. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ol style="list-style-type: none"> <li><b>1. Explain in detail the SOPs for maintaining the log book</b></li> <li><b>2. Explain in detail the components of the log book</b></li> <li><b>3. Explain in detail the content to be written in the log book by operator</b> <ul style="list-style-type: none"> <li>• Fill the log book for fuel consumption, oil change, vehicle mileage, time of scheduled maintenance and other necessary information</li> </ul> </li> </ol> <p>Ask group of trainees to Fill the log book for fuel consumption, oil change, vehicle mileage, time of scheduled maintenance and other necessary information</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Maintain Logbook in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>	<p>Classroom, On Site</p>	<ul style="list-style-type: none"> <li>• Log books for every trainee</li> </ul>

## Multiple Choice Questions (MCQ's)

**Question 6** What are the start engine methods?

- Xx A Start engine and Monitor warning signs and indicators
- B Start engine and drive
- C Start engine and observe the hydraulic system
- D Start engine and lift loads

**Question 7** What is the standard time for warming up engine?

- A 05 Minutes
- B 10 Minutes
- xx C 15 Minutes
- D 30 Minutes

**Question 8** Why is it important to perform cycle function?

- A To avoid risking the operator safety
- Xx B To prevent machinery from breaking down
- C To avoid fuel wastage
- D To ensure that the sound of the machine is fine



**Question 9** Which TWO of the following are causes of machinery break down?

- A Un even working areas
- Xx B Wrong selection of machine as per the capacity and capability of machine
- C Water seepage in Machine blade
- Xx D Use of Low-quality supplies and lubricants

**Question 10** What is the importance of maintaining a log book?

- A Prevent expensive repair works from happening
- B Helps you create specialized maintenance programs
- C Prevent problems regarding warranty claims
- D It increases the safety of operators
- Xx E All of the above

# HEAVY MACHINE OPERATOR



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Module-G

TRAINER GUIDE

National Vocational Certificate Level 2

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## Module G: Park Machines

Learning Unit	Suggested Teaching/ Learning Activities	Delivery Context	Media
<p><b>LU1.</b> Clean under carriage and attachments before parking</p>	<p>Begin the session through an illustrative presentation on how to Clean under carriage and attachments before parking. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ul style="list-style-type: none"> <li>• Describe importance of cleaning tracks, wheels, rollers, and attachments</li> <li>• Explain the trainees in detail about the standard SOPs for Machinery Parking areas on job site</li> <li>• Describe the actions to be taken in case of parking the machines like lowering the boom or attachments, bucket or blades in proper manner and angling the cabin in right direction</li> <li>• Explain the actions related to cleaning of machine before parking</li> <li>• Explain the necessary components to be cleaned fundamentally and why it is must to clean the components before parking</li> </ul> <ol style="list-style-type: none"> <li>1. Perform cleaning of necessary components like undercarriage and attachments with tools and recommended cleaning equipment like shower, soap, drying clothes, dusting clothes and rust proofing chemical.</li> <li>2. Make group of 04 trainees and instruct them to Perform cleaning of necessary components like undercarriage and attachments with tools and recommended cleaning equipment like shower, soap, drying clothes, dusting clothes and rust proofing chemical</li> </ol> <p>Learners must be able to practice and develop their knowledge and skills relating to Clean under carriage and attachments before parking in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>	<p>Classroom, On site</p>	<ul style="list-style-type: none"> <li>• Machines</li> <li>• Cleaning equipment</li> <li>• Water shower</li> <li>• Cleaning soap</li> <li>• Dusting clothes</li> </ul>

<p><b>LU2.</b> Park equipment in appropriate location</p>	<p>Begin the session through an illustrative presentation on how to Park equipment in appropriate location. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ul style="list-style-type: none"> <li>• Describe suitable and safe parking locations, such as dry and clean surface, level, away from fuel storage or water courses, secure areas.</li> <li>• Explain the importance of parking machine properly and safely</li> <li>• Explain the methods of choosing appropriate location for machine parking</li> <li>• Explain the protocols and SOPs for selecting a suitable parking location through a visual presentation</li> <li>• Explain how to secure the boom, bucket, blade or any other extended component before parking</li> <li>• Explain the risky parking locations for Bull Dozer, Wheel Loader, Excavator and Grader</li> </ul> <ol style="list-style-type: none"> <li>1. Perform the securing of extended components like bull dozer blade, wheel loader bucket, excavator boom, grader blade in appropriate manner</li> <li>2. Perform appropriate parking for Bull Dozer, Wheel Loader, Excavator and Grader</li> <li>3. Make group of 04 trainees and instruct them to Perform the securing of extended components like bull dozer blade, wheel loader bucket, excavator boom, grader blade in appropriate manner</li> <li>4. Make group of 04 trainees and instruct them to Perform appropriate parking for Bull Dozer, Wheel Loader, Excavator and Grader</li> </ol> <p>Learners must be able to practice and develop their knowledge and skills relating to Park equipment in appropriate location in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>	<p>Classroom, Parking yard, on site</p>	<ul style="list-style-type: none"> <li>• Multimedia</li> <li>• Parking yard</li> <li>• Bull Dozer</li> <li>• Wheel Loader</li> <li>• Excavator</li> <li>• Grader</li> <li>• Manufacturers Manual</li> </ul>
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<p><b>LU3.</b> Shut down and secure equipment</p>	<p>Begin the session through an illustrative presentation on how to Shut down and secure equipment. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ul style="list-style-type: none"> <li>• Explain the machine shutdown process step by step of Bull Dozer, Wheel Loader, Excavator and Grader</li> <li>• Secure equipment against movement and damage.</li> <li>• Take the trainees to the machines and describe the process practically for every machine</li> <li>• Prepare check list of shut down process and give to trainees for every machine</li> </ul> <ol style="list-style-type: none"> <li>1. Perform shut down process for Bull Dozer, Wheel Loader, Excavator and Grader.</li> <li>2. Make group of 04 trainees and instruct them to repeat the shutdown process step by step for Bull Dozer, Wheel Loader, Excavator and Grader.</li> <li>3. Ask every trainee to write down the check list and show it to other trainee for identifying the mistakes</li> </ol> <p>Learners must be able to practice and develop their knowledge and skills relating to Shut down and secure equipment in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>	<p>Parking yard, on site</p>	<ul style="list-style-type: none"> <li>• Machines with attachments</li> </ul>
<p><b>LU4.</b> Perform housekeeping tasks</p>	<p>Begin the session through an illustrative presentation on how to Perform housekeeping tasks. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ul style="list-style-type: none"> <li>• Explain the necessary housekeeping actions inside the cabin like cleaning of instrument panel, floor, windscreen, controls, levers, operator seat etc.- for bull dozer, wheel loader, excavator and grader</li> <li>• Explain the necessary housekeeping actions outside the cabin on machine like side view mirrors, front back screens, steel stairs, hand supports etc.- for bull dozer, wheel loader, excavator and grader</li> </ul> <ol style="list-style-type: none"> <li>1. Perform housekeeping of machine inside and outside for bull dozer, wheel loader, excavator and grader</li> </ol>	<p>Classroom, Parking yard, on site</p>	<ul style="list-style-type: none"> <li>• Housekeeping equipment like floor swab, duster, mud peeler, wiper for mirrors and screens</li> </ul>

	<p>2. Make group of 04 trainees and instruct them to perform housekeeping of machine inside and outside for bull dozer, wheel loader, excavator and grader</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Perform housekeeping tasks in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>		
<p><b>LU5.</b> Perform visual inspection</p>	<p>Begin the session through an illustrative presentation on how to Perform Visual Inspection. Ensure that the presentation addresses the following points, including demonstrations of equipment and methods where appropriate:</p> <ul style="list-style-type: none"> <li>• Describe importance of visual inspection/end shift routine and its procedures</li> <li>• Explain and make a check list for inspecting machine after parking appropriately for bull dozer, wheel loader, excavator and grader</li> <li>• Describe to how to put wheel stoppers where necessary for wheel loader, excavator and grader</li> </ul> <p>1. Perform visual inspection as per the check list for bull dozer, wheel loader, excavator and grader</p> <p>2. Make group of 04 trainees and instruct them to perform visual inspection as per the check list for bull dozer, wheel loader, excavator and grader</p> <p>Learners must be able to practice and develop their knowledge and skills relating to Perform Visual Inspection in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.</p>	<p>Parking yard, on site</p>	<ul style="list-style-type: none"> <li>• Checklist</li> </ul>

## Multiple Choice Questions (MCQ's)

- Question 11** Is the following statement true or false?  
“The correct time to clean undercarriage is after starting the job”
- A TRUE  
B FALSE
- Question 12** Which of the following is necessary for Parking of Machine safely?
- A Parking Shed  
B Loading ramp  
C Inclined surface  
Xx D Dry and clean surface, level ground, away from fuel storage or water courses
- Question 13** Which is the best practice to adopt while shutting down the machine?
- A Perform visual inspection of Machine before shutdown  
B Lower all the attachments to ground  
C Inspect the undercarriage for leakages  
Xx D All of the above
- Question 14** Housekeeping of Machine do not involve?
- Xx A Leveling the lubricant level  
B Cleaning of mirrors  
C Cleaning of screens and lights

**Question 15** What is the importance of performing visual inspection?

- D Cleaning of operator cabin
- A It helps in reporting any damage timely
- B It supports in saving time when starting the job
- C It shows the real time physical condition of machine after work
- Xx D All of the above



## Frequently Asked Questions (FAQs)

<p>1. What is Competency Based Training (CBT) and how is it different from currently offered trainings in institutes?</p>	<p>Competency-based training (CBT) is an approach to vocational education and training that places emphasis on what a person can do in the workplace as a result of completing a program of training. Compared to conventional programs, the competency-based training is not primarily content based; it rather focuses on the competence requirement of the envisaged job role. The whole qualification refers to certain industry standard criterion and is modularized in nature rather than being course oriented.</p>
<p>2. What is the passing criterion for CBT certificate?</p>	<p>You shall be required to be declared “Competent” in the summative assessment to attain the certificate.</p>
<p>3. What are the entry requirements for this course?</p>	<p>The entry requirement for this course is 8th Grade or equivalent.</p>
<p>4. How can I progress in my educational career after attaining this certificate?</p>	<p>You shall be eligible to take admission in the National Vocational Certificate Level-3 in Leather Products Development Technician (Pattern Maker). You shall be able to progress further to National Vocational Certificate Level-4 in Heavy Construction Machinery Operator Course; and take admission in a level-5, DAE or equivalent course (if applicable). In certain case, you may be required to attain an equivalence certificate from The Inter Board Committee of Chairmen (IBCC).</p>
<p>5. If I have the experience and skills mentioned in the competency standards, do I still need to attend the course to attain this certificate?</p>	<p>You can opt to take part in the Recognition of Prior Learning (RPL) program by contacting the relevant training institute and getting assessed by providing the required evidences.</p>
<p>6. What is the entry requirement for Recognition of Prior Learning program (RPL)?</p>	<p>There is no general entry requirement. The institute shall assess you, identify your competence gaps and offer you courses to cover the gaps; after which you can take up the final assessment.</p>
<p>7. Is there any age restriction for entry in this course or Recognition of Prior Learning program (RPL)?</p>	<p>There are no age restrictions to enter this course or take up the Recognition of Prior Learning program</p>
<p>8. What is the duration of this course?</p>	<p>The duration of the course work is 1,510 hrs. (11 months)</p>
<p>9. What are the class timings?</p>	<p>The classes are normally offered 25 days a month from 08:00am to 01:30pm.</p>

	These may vary according to the practices of certain institutes.
10. What is equivalence of this certificate with other qualifications?	As per the national vocational qualification's framework, the level-4 certificate is equivalent to Matriculation. The equivalence certificate can be obtained from The Inter Board Committee of Chairmen (IBCC).
11. What is the importance of this certificate in National and International job market?	This certificate is based on the nationally standardized and notified competency standards by National Vocational and Technical Training Commission (NAVTTTC). These standards are also recognized worldwide as all the standards are coded using international methodology and are accessible to the employers worldwide through NAVTTTC website.
12. Which jobs can I get after attaining this certificate? Are there job for this certificate in public sector as well?	You shall be able to take up jobs in the local or overseas construction companies in heavy machinery operator job profile.
13. What are possible career progressions in industry after attaining this certificate?	You shall be able to progress up to the level of supervisor after attaining sufficient experience, knowledge and skills during the job. Attaining additional relevant qualifications may aid your career advancement to even higher levels.
14. Is this certificate recognized by any competent authority in Pakistan?	This certificate is based on the nationally standardized and notified competency standards by National Vocational and Technical Training Commission (NAVTTTC). The official certificates shall be awarded by the relevant certificate awarding body.
15. Is on-the-job training mandatory for this certificate? If yes, what is the duration of on-the-job training?	On-the-job training is not a requirement for final / summative assessment of this certificate. However, taking up on-the-job training after or during the course work may add your chances to get a job afterwards.
16. How much salary can I get on job after attaining this certificate?	The minimum wages announced by the Government of Pakistan in 2019 are PKR 17,500. This may vary in subsequent years and different regions of the country. Progressive employers may pay more than the mentioned amount. The heavy Machinery Operator normally earns 20,000 to 25,000 in the start.
17. Are there any alternative certificates which I can take up?	There are some short courses offered by some training institutes on this subject. Some institutes may still be offering conventional certificate courses in the field.
18. What is the teaching language of this course?	The teaching language of this course is Urdu and English.
19. Is it possible to switch to other certificate programs during the	There are some short courses offered by some training institutes on this subject. Some institutes may still be offering conventional certificate courses in the field.

course?	
20.What is the examination / assessment system in this program?	Competency based assessments are organized by training institutes during the course which serve the purpose of assessing the progress and preparedness of each student. Final / summative assessments are organized by the relevant qualification awarding bodies at the end of the certificate program. You shall be required to be declared “Competent” in the summative assessment to attain the certificate.
21.Does this certificate enable me to work as freelancer?	You can start your small business by purchasing your own heavy construction machine and can start earning 50,000 per month. You may need additional skills on entrepreneurship to support your initiative.

