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GENERATOR MECHANIC

TRAINER GUIDE

National Vocational Certificate Level 3

Version 1 - November, 2019

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1. Introduction

Competence-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:

1.1. 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.

1.2. 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.

1.3. 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.

1.4. 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.

1.5. 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.

2. Lesson plans

This manual provides a series of lesson plans that will guide delivery of each module for the *Generator Mechanic Level 3* 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 *Generator Mechanic level 3* 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.

3. 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.

4. Overview of the program

Course: *Generator Mechanic Level 3*	**Total Course Duration:** 670 Hours
Course Overview:	
In this training program trainee will learn and acquire specialized knowledge and particle skills required to function as a Generator mechanic both at domestic and commercial levels. Generator Mechanic will responsible to maintain safety, maintain tools & equipment, identification of faults, diagnose mechanical faults, repair/replace mechanical components, electrical AC Installation, diagnose electrical fault, as per the procedures involved. The specific objectives of developing these qualifications are as under: • Improve the overall quality of training delivery and setting national benchmarks for training of generator mechanic in the country • Provide flexible pathways and progressions to learners enabling them to receive relevant, up-to-date and recent skills • Provide basis for competency-based assessment which is recognized and accepted by employers • Establish a standardized and sustainable system of training for generator mechanic in the country	

Module Title and Aim	**Learning Units**	**Theory Days/hours**	**Workplace Days/hours**	**Timeframe of Modules**
Module 1: **Apply Work Health and Safety Practices (WHS)** **Aim:** This unit describes the skills to work with safety and participate in hazard assessment activities, follow emergency procedures and participate OHS practices in process	**LU1.** Implement safe work practices at work place **LU2.** Participate in hazard assessment activities at a work place **LU3.** Follow emergency procedures at workplace **LU4.** Participate in OHS consultative processes	**04**	**16**	**20**
Module 2: **Identify and Implement Workplace Policy and Procedures** **Aim:** This unit describes the skills and knowledge required to develop and implement a workplace policy & procedures and to modify the policy to	**LU1.** Identify workplace policy & procedures **LU2.** Implement workplace policy & procedures **LU3.** Communicate workplace policy & procedures **LU4.** Review the implementation of workplace policy & procedures	**02**	**08**	**10**

suit changed circumstances. It applies to individuals with managerial responsibilities who undertake work developing approaches to create, monitor and improve strategies and policies within workplaces and engage with a range of relevant stakeholders and specialists.				
Module 3: **Communicate at Workplace** **Aim:** 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.	**LU-1:** Communicate within the organization **LU-2:** Communicate outside the organization **LU-3:** Communicate effectively in workgroup **LU-4:** Communicate in writing	**02**	**08**	**10**
Module 4: **Perform Computer Application Skills** **Aim:** This unit describes the skills and knowledge required to use spreadsheet applications, prepare in page documents, develops familiarity with Word, Excel, Access, PowerPoint, email, and computer graphics basics. It applies to individuals who perform a range of routine tasks in the workplace using a fundamental knowledge of spreadsheets, Microsoft office and computer graphics in under direct supervision or with limited responsibility.	**LU1.** Prepare In-page documents as per required information **LU2.** Prepare Spreadsheets as per required information **LU3.** Use MS Office as per required information **LU4.** Perform computer graphics in basic applications **LU5.** Create Email account for communications	**02**	**08**	**10**
Module 5: **Manage Personal Finances** **Aim**: This unit of competency describes the outcomes required to manage develop, implement and monitor a personal budget in order to plan regular savings and manage debt effectively.	**LU1.** Develop a personal budget **LU2.** Develop long term personal budget **LU3.** Identify ways to maximize future finances	**02**	**08**	**10**

Module 6: **Carryout Basic Electrical Alternate Current (AC) Installation** **Aim:** After completing this learning module, the learner will be able to lay cables, perform single & three phase connections, basic electric wiring and wiring test for carrying out basic electrical alternating current (AC) installation.	**LU1.** Lay cables **LU2**. Perform single-phase Connection **LU3.** Perform three phase Connection **LU4**. Perform Basic Electrical wiring **LU5**. Conduct wiring Test	**20**	**80**	**100**
Module 7: **Repair/Replace Mechanical Components** **Aim:** After completing this learning module, the learner will be able to replace fuel pump, oil pump, fan belt, radiator, oil filter and change cam shaft, crank shaft, valve train components, timing belt and change injector for generator maintenance & repair	**LU1.** Replace fuel / Injection pump **LU2.** Replace oil pump **LU3.** Replace fan belt **LU4**. Replace Radiator **LU5.** Change oil filter **LU6**. Change air filter **LU7.** Change Connecting Rod **LU8**. Change cam shaft **LU9.** Change crank shaft **LU10**. Change valve train Components **LU11.** Change Timing Belt / Timing Gear	**40**	**230**	**270**

	LU12. Change Injector/automizer **LU13**. Change/repair cylinder head **LU14.** Change/repair cylinder block			
Module 8: **Repair/Replace Electrical Components** **Aim:** After completing this learning module, the learner will be able to repair self- starter, replace faulty parts, replace governor, replace cooling fan motor and inspect warning system.	**LU1.** Repair Self-Starter **LU2.** Replace faulty parts of main alternator **LU3.** Change gauges on display panel **LU4**. Repair/ replace governor **LU5**. Replace warning sensors **LU6**. Replace main alternator bearings **LU7**. Change Spark plugs	**34**	**136**	**170**
Module 9: **Install new Generator** **Aim:** After completing this learning module, the learner will be able to maintain supply in accordance with the requirements of industry regulations and established procedures. It encompasses the operation, connection and disconnection as well as assessing load assuring the appropriateness of all generators for the required outcome.	**LU1**. Adopt manufacture procedure **LU2**. Interpret foundation drawing **LU3.** Hoist generator **LU4.** Level generator **LU5**. Distribute electrical load **LU6.** Install change over switch **LU7**. Connect earthing	**17**	**53**	**70**
	TOTAL	**123**	**547**	**670**

FORMAT FOR LESSON PLAN			
Module:			
Learning Unit>			
Learning Outcomes>			
Methods	Key Notes	Media	Time
	Introduction		
	State the Learning Objectives of the lesson. This allows the learners to organize their thoughts on what they will learn and to perform. Also state some questions to recall prior knowledge of learners to arouse their interest and motivation		
	Main Body		
	Present the new information or material that is to be learned. Demonstration of a skill relevant with the Learning Unit is also stated here. Also mention the teaching and learning methods for each leaning element from *Trainer Guidelines*, the relevant media including handouts, power-point slides, videos, white board and time duration for each activity in the relevant columns		
	Conclusion		
	List the strategies used for summarizing and reviewing the lesson delivered. Also mention the strategies for formative assessment to ensure that the transfer of knowledge and skill has been achieved		
	<u>Assessment</u> How this lesson will be assessed?		
			Total time:

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Module 6: Carryout Basic Electrical AC Installation

Learning Unit	Suggested Teaching/ Learning Activities	Delivery Context	Media
LU1: Lay cables	Deliver an illustrated presentation on laying cables while carrying out basic electrical AC installation. Ensure you address the following points: • Interpreting electrical drawing/document • Identifying cables • Laying cables • Performing earthing Prepare either: • A flip chart / A PowerPoint slide / A handout …showing the key topics about laying cables while carrying out basic electrical AC installation. Go through all the key topics briefly and then allocate **one key topic** to each group. Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**. After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for laying cables while carrying out basic electrical AC installation. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. Learners must be able to practice and develop their knowledge and skills relating to laying cables while carrying out basic electrical AC installation. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	• Cables of different sizes • Micrometer • Electrical drawing • Earthing materials (coal, salt, copper plates, GI pipe, earth continuity conductor, copper nut bolts etc.) • Electrical tool kit

LU2: Perform single-phase Connection	Begin this session with an illustrated presentation on performing single phase connection. Ensure that the presentation addresses the following points, including demonstrations of equipment for arranging tools and equipment where appropriate: • Selecting cable gauge • Selecting cables colors • Connecting cables • Insulating Joints Learners need to devise 10 quiz questions with answers based on performing single phase connection. They must make sure their questions cover key topics for identifying hazards at workplace. Issue each learner with 10 blank cards. Each learner should number the cards and write their name on one side with a question about Identifying hazards at workplace. On the reverse of the card, they should write an appropriate answer to their question For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer the question. Discuss the answer with the group and ask the group to determine if the answer is correct. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) The scorekeeper records 1 mark for a correct answer under the appropriate team's score column. Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which team won. After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their answer to the correct one. To prepare for practical sessions, divide the trainees in small groups. Provide each group with a task such as selecting cable gauge, selecting cable color, connecting cables, and insulating joints. Check that each trainee understands their task. Trainees need to practice their skills in identifying workplace hazards in a real or realistic environment.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Cable different sizes Electrical tool kit Micro meter Insulating materials

LU3: Perform three phase Connection	Lead a brainstorm on performing three phase connection. Use ideas from the brainstorm to explain the following key points: • Selecting cable Gauge • Selecting cables colors • Connecting cables • Insulating Joints Prepare either: • A flip chart • A PowerPoint slides • A handout …showing key topics for performing three phase connection. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic** After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic for performing three phase connection. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Learners must be able to practice and develop their knowledge and skills relating to performing three phase connection in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Cable different sizes Electrical tool kit Micro meter Insulating materials

LU4: Perform Basic Electrical wiring	Lead a brainstorm on performing basic electrical wiring. Use ideas from the brainstorm to explain the following key points: • Measuring cables as per requirement • Connecting cables • Performing joints • Insulating Joints Display a slide or flip chart with a key question relating to performing basic electrical wiring **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to performing basic electrical wiring. Learners must be able to practice and develop their knowledge and skills relating to performing basic electrical wiring in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Cable different sizes Electrical tool kit Micro meter Insulating materials Wiring materials

LU5: Conduct wiring Test	Lead a discussion about conducting wiring test. Use real examples to support the discussion and ensure the discussion considers: • Operating multi-meter for voltage and current. • Performing continuity test • Performing polarity test • Performing earthing test • Performing insulation test • Record test results Learners need to devise 10 quiz questions with answers based on conducting wiring test. They must make sure their questions cover key topics for Following workplace safety policies. Issue each learner with 10 blank cards. Each learner should number the cards and write their name on one side. They then need to devise a two-part question for each card about a key topic relating to conducting wiring test. The first part of the question should ask for a fact about conducting wiring test. The second part should need an explanation or an example. On the reverse of the card, they should write an appropriate two-part answer to their question. An explanation should be short and concise. If examples are requested, the learner must provide two or three alternative examples. For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer **both parts of** the question. Discuss the answer with the group and ask the group to determine if the answer is correct. If either part of the answer is not correct, the question passes to all players in Team B to answer. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) Under the appropriate team's score column, the scorekeeper records 2 mark for each correct part of the answer given by the original player answering the question. If play passes to the whole team, only 1 mark is recorded for each part of the question. Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which team won. After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their answer to the correct one. Learners must be able to practice and develop their knowledge and skills relating to conducting wiring test in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Multi mater Megger Insulation tester Series test lamp

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Module 7: Repair/Replace Mechanical Components

Learning Unit	Suggested Teaching / Learning Activities	Delivery Context	Media
LU1: Replace fuel / Injection pump	Deliver an illustrated presentation on Replacing fuel/injection pump. Ensure you address the importance of the following points: • Selecting tools and equipment • Replacing fuel pipes • Replacing fuel filter • Replacing the fuel injunction pump • Calibrating injection pump • Reinstalling calibrated injection pump Prepare either: • A flip chart • A PowerPoint slides • A handout …showing the key topics about replacing fuel/injection pump. Go through all the key topics briefly and then allocate **one key topic** to each group. Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**. After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for replacing fuel/injection pump. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. Learners must be able to practice and develop their knowledge and skills relating to replacing fuel/injection pump in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Fuel injection pump Fuel pipe Fuel filter Socket box Ring spanner set

Module 7: Repair/Replace Mechanical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU2: Replace oil pump	Lead a brainstorm on replacing oil pump. Use ideas from the brainstorm to explain the following key points • Selecting Tools and equipment • Removing oil pump • Repairing / Replacing faulty components of oil pump Display a slide or flip chart with a key question relating to replacing oil pump. **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to replacing oil pump. Learners must be able to practice and develop their knowledge and skills relating to replacing oil pump in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Oil pump Tool kit

Module 7: Repair/Replace Mechanical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU3: Replace fan belt	Lead a discussion about Replacing fan belt. Use real examples to support the discussion and ensure the discussion considers: • Collecting tools and equipment • Identifying size of fan belt • Replacing fan belt • Adjusting fan belt Learners need to devise 10 quiz questions with answers based on how to Replace fan belt. They must make sure their questions cover key topics for how to develop and use communication skills in a hospitality setting. Issue each learner with 10 blank cards. Each learner should number the cards and write their name on one side with a question about replacing a fan belt. On the reverse of the card, they should write an appropriate answer to their question. For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer the question. Discuss the answer with the group and ask the group to determine if the answer is correct. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) The scorekeeper records 1 mark for a correct answer under the appropriate team's score column. Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which team won. After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their answer to the correct one. Learners must be able to practice and develop their knowledge and skills relating to Replacing fan belt in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Fan belt Ring spanner set Adjustment lever

Module 7: Repair/Replace Mechanical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU4: Replace Radiator	Lead a discussion about Replacing Radiator. Use real examples to support the discussion and ensure the discussion considers: • Arranging tools and equipment • Uninstalling the radiator • Cleaning and flushing radiator • Repairing radiator • Reinstalling radiator Display a flip chart showing the following key question: *'What are the steps to Replace Radiator?'* Give each learner a sheet of paper and asked them to write their name at the top. Explain to learners that they will be sharing their work with other learners. Ask learners to write silently for 3-5 minutes answering the question displayed on the flip chart. When learners have completed writing, instruct them to pass their paper to the learner on their left. Each learner will read what their partner has passed to them and write a response. This will also be done silently. After another 2-3 minutes, instruct the learners to pass the paper to their left a second time. Repeat the same procedure, also done in silence. At the end of the activity, ask the learners to return the paper to the original writer. Allow learners a few moments to read over the responses to their writing. Ask learners to work in pairs to reflect on and discuss the responses to the question on the flip chart. When this activity is concluded, collect the papers and make copies for each learner. Learners must be able to practice and develop their knowledge and skills relating to Replacing Radiator in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Radiator Flushing materials Radiator pressure cap Radiator bottle Tool box

Module 7: Repair/Replace Mechanical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU5: Change oil filter	Lead a brainstorm on Changing Oil Filter of generator. Use ideas from the brainstorm to explain the following key points • Collecting tools and equipment • Selecting proper size of oil filter • Removing oil filter • Installing oil filter Display a slide or flip chart with a key question relating to changing oil filter of generator. **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to changing oil filter of generator. Learners must be able to practice and develop their knowledge and skills relating to changing oil filter of generator in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Oil filter Filter chain

Module 7: Repair/Replace Mechanical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU6: Change air filter	Lead a discussion about Changing air filter of generator. Use real examples to support the discussion and ensure the discussion considers: • Collecting tools and equipment • Selecting proper size of air filter • Removing air filter • Installing air filter Prepare either: • A flip chart • A PowerPoint slides • A handout …showing key topics for changing air filter of a generator. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic for changing air filter. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for ensuring professional standards are maintained for uniform and hygiene throughout the shift. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. Learners must be able to practice and develop their knowledge and skills relating to changing air filter of generator in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Classroom and Workshop or Workplace	Air filter

Module 7: Repair/Replace Mechanical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU7: Change Connecting Rod	Deliver an illustrated presentation on Changing connecting Rod of generator. Ensure you address the importance of the following points: • Selecting tools and equipment • Removing engine from main alternator • Dismantling engine • Removing connecting rod • Repairing /replacing connecting rod Prepare either: • A flip chart • A PowerPoint slides • A handout …showing the key topics about Changing connecting rod of generator. Go through all the key topics briefly and then allocate **one key topic** to each group. Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**. After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for changing connecting rod. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. Learners must be able to practice and develop their knowledge and skills relating to changing connecting rod in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Classroom and Workshop or Workplace	Generator engine Connecting rod with its accessories Toolkit

Module 7: Repair/Replace Mechanical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU8: Change Cam shaft	Lead a brainstorm on changing cam shaft of generator. Use ideas from the brainstorm to explain the following key points: • Identifying tools and equipment • Removing tippet cover • Removing cam shaft • Repairing and replacing cam shaft Display a slide or flip chart with a key question relating to Changing cam shaft. **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to changing cam shaft. Learners must be able to practice and develop their knowledge and skills relating to changing cam shaft in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Generator engine Cam shaft with its accessories Toolkit

Module 7: Repair/Replace Mechanical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU9: Change crank shaft	Lead a discussion about changing crank shaft of generator. Use real examples to support the discussion and ensure the discussion considers: • Identifying tools and equipment • Removing fly wheel • Opening main big end • Removing Timing plate and timing gear / Pulley • Removing hosing • Removing main oil seal plate • Removing crank shaft • Repairing and replacing Crank shaft Learners need to devise 10 quiz questions with answers based on Changing crank shaft. They must make sure their questions cover key topics for how to develop and use communication skills in a hospitality setting. Issue each learner with 10 blank cards. Each learner should number the cards and write their name on one side with a question about how to change crank shaft. On the reverse of the card, they should write an appropriate answer to their question. For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer the question. Discuss the answer with the group and ask the group to determine if the answer is correct. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) The scorekeeper records 1 mark for a correct answer under the appropriate team's score column. Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which team won. After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their answer to the correct one. Learners must be able to practice and develop their knowledge and skills relating to changing crank shaft in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Classroom and Workshop or Workplace	Generator engine Crank shaft Toolkit

Module 7: Repair/Replace Mechanical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU10: Change valve train Components	Lead a discussion about Changing valve train components. Use real examples to support the discussion and ensure the discussion considers: • Identifying tools and equipment • Removing tippet cover, atomizer pipe timing belt, rocker and head bolt • Dressing/ Polishing valve and valve seats • Replacing head gas kit • Reinstalling valve train component Display a flip chart showing the following key question: *'Explain the method to change valve train components?'* Give each learner a sheet of paper and asked them to write their name at the top. Explain to learners that they will be sharing their work with other learners. Ask learners to write silently for 3-5 minutes answering the question displayed on the flip chart. When learners have completed writing, instruct them to pass their paper to the learner on their left. Each learner will read what their partner has passed to them and write a response. This will also be done silently. After another 2-3 minutes, instruct the learners to pass the paper to their left a second time. Repeat the same procedure, also done in silence. At the end of the activity, ask the learners to return the paper to the original writer. Allow learners a few moments to read over the responses to their writing. Ask learners to work in pairs to reflect on and discuss the responses to the question on the flip chart. When this activity is concluded, collect the papers and make copies for each learner. Learners must be able to practice and develop their knowledge and skills relating to changing valve train components in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Valve train with accessories Head gas kit Head assembly Valve lapping stick and paste Tool kit

Module 7: Repair/Replace Mechanical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU11: Change Timing Belt / Timing Gear	Lead a brainstorm on changing timing belt/timing gear of generator. Use ideas from the brainstorm to explain the following key points: • Identifying tools and equipment • Identifying timing marks • Loosening the adjustment bolt • Removing the timing belt/gear • Reinstalling the timing belt / gear Display a slide or flip chart with a key question relating to changing Timing Belt/Timing Gear of generator. **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to changing Timing Belt/Timing Gear of generator. Learners must be able to practice and develop their knowledge and skills relating to changing Timing Belt/Timing Gear of generator in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Timing belt Timing gear Timing chain Tool Box

Module 7: Repair/Replace Mechanical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU12: Change Injector/atomizer	Lead a discussion about Changing Injector/Atomizer of generator. Use real examples to support the discussion and ensure the discussion considers: • Identifying the tools and equipment • Removing the injection pipe • Removing the mounting bolt of injector • Removing the injector • Calibrating the injectors • Installing the injectors Prepare either: • A flip chart / A PowerPoint slide / A handout …showing key topics for changing Injector/Atomizer of a generator. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic for Changing Injector/Automizer. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for ensuring professional standards are maintained for uniform and hygiene throughout the shift. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. Learners must be able to practice and develop their knowledge and skills relating to changing Injector/Automizer of generator in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Injector/automizer Injector pressure tester Tool kit

Module 7: Repair/Replace Mechanical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU13: Change/repair cylinder head	Lead a discussion about changing/Repairing Cylinder head of generator. Use real examples to support the discussion and ensure the discussion considers: • Identifying tools and equipment • Repairing Valve seat • Performing Top overhaul • Performing head tightening sequence Learners need to devise 10 quiz questions with answers based on Changing/Repairing Cylinder head. They must make sure their questions cover key topics for how to change or repair cylinder head. Issue each learner with 10 blank cards. Each learner should number the cards and write their name on one side with a question about how to change or repair cylinder head. On the reverse of the card, they should write an appropriate answer to their question. For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer the question. Discuss the answer with the group and ask the group to determine if the answer is correct. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) The scorekeeper records 1 mark for a correct answer under the appropriate team's score column. Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which team won. After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their answer to the correct one. Learners must be able to practice and develop their knowledge and skills relating to changing/Repairing Cylinder head in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Cylinder head Tool Kit Torque wrench

Module 7: Repair/Replace Mechanical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU14: Change/repair cylinder block	Lead a discussion about Changing/Repairing Cylinder block. Use real examples to support the discussion and ensure the discussion considers: • Identifying tools and equipment • Performing major overhaul • Changing sleeve • Performing Honing • Replacing piston and piston rings Display a flip chart showing the following key question: *'Explain the method of changing or repairing Cylinder block?'* Give each learner a sheet of paper and asked them to write their name at the top. Explain to learners that they will be sharing their work with other learners. Ask learners to write silently for 3-5 minutes answering the question displayed on the flip chart. When learners have completed writing, instruct them to pass their paper to the learner on their left. Each learner will read what their partner has passed to them and write a response. This will also be done silently. After another 2-3 minutes, instruct the learners to pass the paper to their left a second time. Repeat the same procedure, also done in silence. At the end of the activity, ask the learners to return the paper to the original writer. Allow learners a few moments to read over the responses to their writing. Ask learners to work in pairs to reflect on and discuss the responses to the question on the flip chart. When this activity is concluded, collect the papers and make copies for each learner. Learners must be able to practice and develop their knowledge and skills relating to changing/Repairing Cylinder block in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Cylinder block Sleeves Piston & piston rings Honing machine Toolkit

GENERATOR MECHANIC

Module-8

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Module 8: Repair/Replace Electrical Components

Learning Unit	Suggested Teaching / Learning Activities	Delivery Context	Media
LU1: Repair Self-Starter	Begin this session with an illustrated presentation on Repairing Self-Starter. Ensure that the presentation addresses the following points, including demonstrations of equipment for arranging tools and equipment where appropriate: • Identifying tools and equipment • Checking the self-starter relay • Checking self- starter switch contacts. • Checking starter loose connections • Checking self- starter armature • Checking starter field coil for short circuit • Checking drive system of self-gear • Checking self- starter bushes Prepare either: • A flip chart / A PowerPoint slide / A handout …showing the key topics about Repairing Self-Starter. Go through all the key topics briefly and then allocate **one key topic** to each group. Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**. After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for Repairing Self-Starter. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. Learners must be able to practice and develop their knowledge and skills relating to Repairing Self-Starter in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Self-starter Multimeter Tool kit

Module 8: Repair/Replace Electrical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU2: Replace faulty parts of main alternator	Lead a discussion about replacing faulty parts of main alternator. Use real examples to support the discussion and ensure the discussion considers: • Selecting tools and equipment • Replacing carbon-bushes • Replacing of self-excitation system • Replacing Automatic Voltage Regulator (AVR) • Replacing alternator terminal block (connection plate) Display a slide or flip chart with a key question relating to replacing faulty parts of main alternator. **Step 1 – Think** Working on their own, each learner thinks about the question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner pairs up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to replacing faulty parts of main alternator. Learners must be able to practice and develop their knowledge and skills relating to replacing faulty parts of main alternator in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Main alternator Carbon brushes Diodes AVR Tool kit

Module 8: Repair/Replace Electrical Components

Learning Unit	Suggested Teaching / Learning Activities	Delivery Context	Media
LU3: Change gauges on display panel	Lead a discussion about changing gauges on display panel. Use real examples to support the discussion and ensure the discussion considers: • Identifying tools and equipment • Replacing temperature gauge • Replacing oil pressure gauge • Replacing AC Ampere meter • Replacing DC charging gauge • Replacing revolution per minute (RPM) meter • Replacing AC volt meter • Replacing frequency meter • Replacing hour meter Prepare either: • A flip chart • A PowerPoint slides • A handout …showing key topics for changing gauges on display panel. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic for changing gauges on display panel. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. Learners must be able to practice and develop their knowledge and skills relating to changing gauges on display panel in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Temperature gauge Oil pressure gauge AC Ampere meter DC charging gauge Revolution per minute (RPM) meter AC volt meter Frequency meter Hour meter Tool kit

Module 8: Repair/Replace Electrical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU4: Repair/ replace governor	Lead a brainstorm on repairing/replacing governor. Use ideas from the brainstorm to explain the following key points: • Identifying tools and equipment • Removing fuel pipe lines • Removing timing plate • Removing fuel injection pump gear • Repairing Governor • Installing Governor Prepare either: • A flip chart / A PowerPoint slide / A handout …showing the key topics about repairing/replacing governor. Go through all the key topics briefly and then allocate **one key topic** to each group. Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**. After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for repairing/replacing governor. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. Learners must be able to practice and develop their knowledge and skills relating to repairing/replacing governor in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Governor Tool kit

Module 8: Repair/Replace Electrical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU5: Replace warning sensors	Lead a discussion about replacing warning sensors. Use real examples to support the discussion and ensure the discussion considers: • Selecting tools and equipment • Removing and replacing temperature sensors • Removing and replacing oil pressure sensors • Removing and replacing fuel sensors Display a slide or flip chart with a key question relating to replacing warning sensors. **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to replacing warning sensors. Learners must be able to practice and develop their knowledge and skills relating to replacing warning sensors in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Tool kit

Module 8: Repair/Replace Electrical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU6: Replace main alternator bearings	Lead a discussion about replacing main alternator bearings. Use real examples to support the discussion and ensure the discussion considers: • Arranging tools and equipment • Dismantling main alternator • Pulling out the bearings • Installing bearings Prepare either: • A flip chart • A PowerPoint slides • A handout …showing key topics for replacing main alternator bearings. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic of replacing main alternator bearings. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Learners must be able to practice and develop their knowledge and skills relating to replacing main alternator bearings in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Main alternator. Bearing Puller Bearing Tool kit

Module 8: Repair/Replace Electrical Components			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU7: Change Spark plugs	Lead a discussion about changing spark plugs. Use real examples to support the discussion and ensure the discussion considers: • Arranging tools and equipment • Removing the spark plug cables • Removing spark plugs • Installing spark plugs Display a flip chart showing the following key question: *'List the steps involved in changing spark plugs?'* Give each learner a sheet of paper and asked them to write their name at the top. Explain to learners that they will be sharing their work with other learners. Ask learners to write silently for 3-5 minutes answering the question displayed on the flip chart. When learners have completed writing, instruct them to pass their paper to the learner on their left. Each learner will read what their partner has passed to them and write a response. This will also be done silently. After another 2-3 minutes, instruct the learners to pass the paper to their left a second time. Repeat the same procedure, also done in silence. At the end of the activity, ask the learners to return the paper to the original writer. Allow learners a few moments to read over the responses to their writing. Ask learners to work in pairs to reflect on and discuss the responses to the question on the flip chart. When this activity is concluded, collect the papers and make copies for each learner. Learners must be able to practice and develop their knowledge and skills relating to changing spark plugs in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Spark plugs Spark plug spanner

GENERATOR MECHANIC

Module-9

TRAINER GUIDE

National Vocational Certificate Level 3

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Module 9: Install new Generator			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU1: Adopt manufacture procedure	Deliver an illustrated presentation on adopting manufacture procedure. Ensure you address the following points: • Identifying Gross weight of the generator • Identifying foundation holes of generator as per Manufacturer • Ensuring holes in concrete base Prepare either: • A flip chart / A PowerPoint slide / A handout …showing the key topics about adopting manufacture procedure. Go through all the key topics briefly and then allocate **one key topic** to each group. Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**. After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for adopting manufacture procedure. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. Learners must be able to practice and develop their knowledge and skills relating to adopting manufacture procedure in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Generator Multimeter

Module 9: Install new Generator

Learning Unit	Suggested Teaching / Learning Activities	Delivery Context	Media
LU2: Interpret foundation drawing	Begin this session with an illustrated presentation on interpreting foundation drawing. Ensure that the presentation addresses the following points, including demonstrations of equipment for arranging tools and equipment where appropriate: • Measuring distance between foundation holes • Measuring diameters of foundation holes • Comparing diameters of foundation bolts as per specification Learners need to devise 10 quiz questions with answers based on interpreting foundation drawing. They must make sure their questions cover key topics for identifying hazards at workplace. Issue each learner with 10 blank cards. Each learner should number the cards and write their name on one side with a question about interpreting foundation drawing. On the reverse of the card, they should write an appropriate answer to their question. For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer the question. Discuss the answer with the group and ask the group to determine if the answer is correct. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) The scorekeeper records 1 mark for a correct answer under the appropriate team's score column. Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which team won. After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their answer to the correct one. To prepare for practical sessions, divide the trainees in small groups. Provide each group with a task such as Measuring distance between foundation holes, measuring diameters of foundation holes, and Comparing diameters of foundation bolt as per specification. Check that each trainee understands their task. Trainees need to practice their skills in interpreting foundation drawing in a real or realistic environment.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Foundation drawing Foundation Generator

Module 9: Install new Generator			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU3: Hoist generator	Lead a brainstorm on hoisting generator. Use ideas from the brainstorm to explain the following key points: • Locating loading hooks of generator • Securing ropes and balance generator • Placing generator on concrete foundation with chain pulley Prepare either: • A flip chart • A PowerPoint slides • A handout …showing key topics for hoisting generator. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic for hoisting generator. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Learners must be able to practice and develop their knowledge and skills relating to hoisting generator in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Chain pulley Tool kit

Module 9: Install new Generator			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU4: Level generator	Lead a brainstorm on Leveling generator. Use ideas from the brainstorm to explain the following key points: • Putting foundation bolts in foundation holes • Leveling generator length and width wise • Filling holes in base with concrete Display a slide or flip chart with a key question relating to Leveling generator **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to Leveling generator Learners must be able to practice and develop their knowledge and skills relating to Leveling generator in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Chain pulley Level meter Tool box

Module 9: Install new Generator

Learning Unit	Suggested Teaching / Learning Activities	Delivery Context	Media
LU5: Distribute electrical load	Lead a discussion about distributing electrical load. Use real examples to support the discussion and ensure the discussion considers: • Estimating total electrical load • Distributing load on each phase equally Learners need to devise 10 quiz questions with answers based on distributing electrical load. They must make sure their questions cover key topics for distributing electrical load. Issue each learner with 10 blank cards. Each learner should number the cards and write their name on one side. They then need to devise a two-part question for each card about a key topic relating to distributing electrical load. The first part of the question should ask for a fact about distributing electrical load. The second part should need an explanation or an example. On the reverse of the card, they should write an appropriate two-part answer to their question. An explanation should be short and concise. If examples are requested, the learner must provide two or three alternative examples. For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer **both parts of** the question. Discuss the answer with the group and ask the group to determine if the answer is correct. If either part of the answer is not correct, the question passes to all players in Team B to answer. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) Under the appropriate team's score column, the scorekeeper records 2 mark for each correct part of the answer given by the original player answering the question. If play passes to the whole team, only 1 mark is recorded for each part of the question. Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which team won. After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their answer to the correct one. Learners must be able to practice and develop their knowledge and skills relating to distributing electrical load in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Clamp on Meter Multimeter Electrical tool kit

Module 9: Install new Generator			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU6: Install change over switch	Lead a discussion about Installing change over switch. Use real examples to support the discussion and ensure the discussion considers: • Mounting change over switch/ATS on wall • Connecting load side with changeover switch • Connecting generator output with changeover switch • Connecting external power source with changeover switch Prepare either: • A flip chart • A PowerPoint slides • A handout …showing key topics for Installing change over switch. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic for Installing change over switch. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Learners must be able to practice and develop their knowledge and skills relating to Installing change over switch in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Change over switch/ATS Rawal bolts Electrical tool kit

Module 9: Install new Generator			
Learning Unit	**Suggested Teaching / Learning Activities**	**Delivery Context**	**Media**
LU7: Connect earthing	Lead a brainstorm on connect earthing. Use ideas from the brainstorm to explain the following key points: • Arranging tools and equipment • Ensuring earthing as per standards • Connecting earth cable with generator body Display a slide or flip chart with a key question relating to connect earthing. **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to connect earthing. Learners must be able to practice and develop their knowledge and skills relating to connect earthing in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.	Class room with multimedia aid, audio-visual facilities and flip charts Workshop or Workplace	Earthing cable

Frequently Asked Questions:

1. What is Competency Based Training (CBT) and how is it different from currently offered trainings in institutes?	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.
2. What is the passing criterion for CBT certificate?	You shall be required to be declared “Competent” in the summative assessment to attain the certificate.
3. What are the entry requirements for this course?	The entry requirement for this course is 8th Grade or equivalent.
4. How can I progress in my educational career after attaining this certificate?	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).
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?	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.
6. What is the entry requirement for Recognition of Prior Learning program (RPL)?	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.
7. Is there any age restriction for entry in this course or Recognition of Prior Learning program (RPL)?	There are no age restrictions to enter this course or take up the Recognition of Prior Learning program
8. What is the duration of this course?	The duration of the course work is 1,510 hrs. (11 months)
9. What are the class timings?	The classes are normally offered 25 days a month from 08:00am to 01:30pm. 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 qualifications 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 (NAVTTC). These standards are also recognized worldwide as all the standards are coded using international methodology and are accessible to the employers worldwide through NAVTTC 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 (NAVTTC). 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 leaching language of this course is Urdu and English.
19. Is it possible to switch to other certificate programs during the course?	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.
20. What is the examination /	Competency based assessments are organized by training institutes during the course

assessment system in this program?	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.

Test Yourself (Multiple Choice Questions)

MODULE	**6**	Carryout Basic Electrical Installation (Alternating Current-AC)		
Question	**1**	In single core cables armoring is not done to	A	Avoid excessive sheath losses
			B	Make it flexible
			C	Either of the above
			D	None of the above
Question	**2**	Earth wire or ground wire is made of	A	Copper
			B	Aluminium
			C	Iron
			D	Galvanized steel

Question 3 The objective of earthing is

A To provide as low resistance possible to the ground

B To provide as high resistance possible to the ground

C To provide flow of positive sequence currents

D To provide flow of negative and zero sequence currents

Question 4 Which is the most type of wiring used in domestic applications?

A Conduit wiring

B Cleat wiring

C Batten wiring

D TRS wiring

Question 5 Megger is a

A Source of emf

B Source to measure high resistance

C Type of null detector

D Current carrier

MODULE 7 Repair/Replace Mechanical Components

Question 1 The plunger of a jerk type pump is driven by a

A Crankshaft

B **Camshaf**t

C Pully

D Both A and C

Question 2 In the following system, lubricating oil is carried in separate tanks from where it is fed to the engine

A Mist lubrication system

B Wet sump system

C **Dry sump system**

D Splash system

Question 3 The following part is not lubricated by pressure feed system

A Timing gears

B **Valve rods and push rods**

C Rockers arms

D Honey comb

Question 4 In _____ radiator, each tube contains individual fins surrounding it.

A **Gilled type**

B Honey comb

C Tubular type

D B and C

Question 5 The following is considered as best antifreeze solution

A **Ethylene glycol**

B Distilled glycerin

C Methanol

D Denatured alcohol

MODULE	**8**	Repair/Replace Mechanical Components		
Question	**1**	An alternator is also called	A	Synchronous generator
			B	Turbo generator
			C	Asynchronous generator
			D	Generator
Question	**2**	Three phase alternators are invariably Y-connected because	A	Magnetic losses are minimized
			B	Less turns of wire are required
			C	Smaller conductors can be used
			D	Higher terminal voltage is obtained

Question 3	Windings of star-delta starter while starting and during running are connected in	A	Star, delta
		B	Delta, delta
		C	Star, Star
		D	Delta , Star
Question 4	An Ampere meter measures:	A	Current
		B	Voltage
		C	Frequency
		D	Power
Question 5	Which one of the following measures voltage?	A	Voltmeter
		B	Ampere meter
		C	Frequency meter
		D	Hour meter

MODULE	**9**	Install New Generator		
Question	**1**	Active power and apparent power are respectively represented by?	A	KW and KVAR
			B	KVAR and KVA
			C	KVA and KVAR
			D	KW and KVA
Question	**2**	What is connected load?	A	Installed electrical load in the premises of the consumer.
			B	Maximum load a consumer draws
			C	Load drawn by a consumer at any instant
			D	Load drawn at peak times.

Question 3 The function of change over switch is :

A To transfer electricity from power grid to local generator

B To increase the voltage of the system

C To increase frequency of the system

D To increase current of the system

Question 4 The foundation for generator must be able to withstand:

A Installation's weight

B Apparent power

C Real power

D Reactive power

Question 5 ATS Stands for :

A Ampere transfer switch

B Automatic transfer switch

C Auto turbine switch

D After transfer switch

Answers

MODULE 6: Q1.a Q2.d Q3.a Q4.a Q5.b

MODULE 7: Q1.b Q2.c Q3.b Q4.a Q5.a

MODULE 8: Q1.a Q2.b Q3.a Q4.a Q5.a

MODULE 9: Q1.d Q2.a Q3.a Q4.a Q5.b

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