## THE UNITED REPUBLIC OF TANZANIA

## MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MMM	MANNAN MANY
THE UNIT	ED REPUBLIC OF TANZANIA
MINI	STRY OF EDUCATION,
SCIEN	
Centille	cate of Approval
	No. 1981
Title of Publication	Electrical Installation Syllabus for Ordinary Secondary Education Vocational Stream Form I-IV
Publisher:	Vocational Education and Training Authority
Author:	Ministry of Education, Science and Technology
ISBN:	978-9912-750-27-2
This Syllabus was	approved by the Ministry of Education,
Science and Techr	ology on .26th January 2025. as . Syllabus
for Electrical Instal	lation for Ordinary Secondary Education
Vocational Stream	Form I-IV in Tanzania.
Churda	
Dr Lyabwene M. Mtah	abwa
and the second	Jeation
yabwene M. Mtah	abwa

ELECTRICAL INSTALLATION SYLLABUS FOR ORDINARY SECONDARY

EDUCATION VOCATIONAL STREAM FORM I-IV

© Vocational Education and Training Authority (VETA), 2022

Published 2022

Revised 2025

Vocational Education and Training Authority (VETA)

12 VETA Road,

41104 Tambukareli,

P.O. BOX 802,

Dodoma - Tanzania,

Telephone: +255 26 2963661

Website: www<u>.veta.go.tz</u>

Email: <u>info@veta.go.tz</u>

ISBN: 978-9912-750-2-72

This document should be cited as: Ministry of Education, Science and Technology. (2025). *Electrical Installation for Ordinary Secondary Education Vocational Stream Form I*–IV. Vocational Education and Training Authority.

All rights reserved. No part of this Syllabus may be reproduced, stored in any retrieval system, or transmitted in any form or by any means whether electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the Vocational Education and Training Authority.

## **Table of Contents**

List o	f Tablesiv
Abbro	eviations and Acronymsv
Defin	itions of Key Terms vi
Ackn	owledgementsvii
1.0.	Introduction1
2.0.	Main Objectives of Education in Tanzania2
3.0.	General Competencies for Ordinary Secondary Education Vocational Stream
4.0.	General Competencies of the Occupation
5.0.	Main and Specific Competencies
6.0.	The Roles of Teachers, Students, and Parents in Teaching and Learning
6.1	The Teacher
6.2	The student
6.3	The parent/guardian
7.0.	Teaching and Learning Methods7
8.0.	Teaching and Learning Resources7
9.0.	Assessment7
9.1	Project work
10.0	Number of Periods
11.0	Teaching and Learning Contents9

## List of Tables

Table 1: Contribution of Continuous Assessment and National Examination in the final score	8
Table 2: Detailed contents for Form One	10
Table 3: Detailed contents for Form Two	76
Table 4: Detailed contents for Form Three	131
Table 5: Detailed Contents for Form Four	205

## Abbreviations and Acronyms

AC	Alternating current
BOQ	Bill of Quantities
CA	Computer Application
CAD	Computer-Aided Design
CAD	Computer -Added Designing
CAL	Computer-Aided Learning
CAM	Computer-Aided Manufacturing
CBET	Competency-Based Education and Training
DC	Direct Current
DVD	Digital Video Disk
FA	Field Attachment
NVA	National Vocational Award
NGOs	Non-Governmental Organisations
OSHA	Occupational Safety and Health Authority
PLC	Programmable Logic Controller
PVC	Polyvinyl Chloride
RC	Resistor Capacitor
RL	Resistor Inductor
RLC	Resistor Capacitor Inductor

### **Definitions of Key Terms**

**Assessment:** The process of collecting evidence and making judgments on whether competence has been achieved, or whether specific skills and knowledge have been achieved that will lead to the attainment of competency.

**Circumstantial knowledge:** In-depth knowledge that facilitates decision-making across various situations and interrelated issues.

**Competence:** The ability to use knowledge, understanding, practical and thinking skills to perform effectively to the workplace standards required in employment.

**Element:** A sub-unit, or step, reflects the learning sequence aimed at achieving the broad objectives of a unit.

**Performance criteria**: Indicates the expected results or outcome in the form of evaluative statements.

**Standard**: A set of statements, which if proven true under working conditions, means that an individual is meeting an expected level and type of performance.

**Knowledge assessment:** This is essential knowledge needed in order to demonstrate competencies that are associated with performing a given task.

**Unit**: A statement of broad learning objectives, which prescribe the requirements of a standard in the form of practical skills, knowledge, and appropriate attitudes.

#### Acknowledgements

The writing of the Electrical Installation Syllabus for Ordinary Secondary Education Vocational Stream Form I-IV was a collaborative effort that involved the dedication and expertise of a wide range of organisations and individuals. Vocational Education and Training Authority (VETA) would like to thank all the organisations and experts who contributed to developing this Syllabus. VETA appreciates the expertism from individuals, and their time, effort, and resources that were devoted to this important task. Their contributions have been crucial in developing a Syllabus that is both relevant and comprehensive, aimed at equipping students with the skills necessary for success in their fields. Furthermore, valuable inputs from employers in both formal and informal sectors during labour market surveys are also acknowledged. Likewise, VETA thanks the Ministry of Education, Science, and Technology in a special way for facilitating the preparation, printing, and distribution of this Syllabus.

For and on behalf of:

Vocational Education and Training Authority (VETA)

CPA. Anthony M. Kasore **DIRECTOR GENERAL** 

#### 1.0. Introduction

Electrical installation is one of the occupations taught in the Ordinary Secondary Education Vocational Stream. Electrical installation occupation refers to the profession focused on the installation, maintenance, and repair of electrical systems in buildings, industrial facilities, and infrastructure. The electrical installation occupation is a vital and dynamic field focused on the setup, maintenance, and repair of electrical systems that power homes, businesses, and industries. Professionals in this field, often known as electricians/technicians, play a crucial role in ensuring that electrical wiring, equipment, and components are safely and efficiently installed and functioning.

Electrical installers are skilled technicians who handle a variety of tasks related to electrical infrastructure. They work with different components such as wiring, circuit breakers, lighting fixtures, power distribution systems, and various electrical appliances. Their responsibilities include ensuring that all installations adhere to local safety codes and regulations, conducting inspections, troubleshooting electrical problems, and performing routine maintenance to prevent future breakdown issues.

The occupation demands a strong understanding of electrical theory, practical skills, and a keen attention to detail, making it an essential and in-demand profession in today's increasingly technology-driven world.

Electrical installation plays a crucial role in Tanzania's economy and its pursuit of sustainable development. As the country continues to grow and modernise, the demand for reliable and efficient electrical systems has become increasingly significant. Therefore, electrical installation is integral to Tanzania's economic advancement and sustainable development. It supports industrialisation, enhances energy access, promotes environmental sustainability, creates jobs, and improves infrastructure, all of which are crucial for the country's socio-economic transformation.

Upon completion of the Programme, students will possess both theoretical and practical knowledge of Electrical Installation, from design, preparation of electrical layouts, installation drawings, installation, testing, and maintenance of electrical equipment and machinery. Additionally, students will be equipped with the business skills necessary for managing an electrical installation enterprise, ensuring high standards of quality and innovation in all aspects of the electrical engineering field.

A graduate of this occupation may be employed in both Government and private sectors such as ministries/departments, training institutions, research institutions, forest agencies and projects, self-employment, small, medium, and large wood industries, and in Non-Governmental Organisations (NGOs).

1

Training requirements for an electrical installation occupation include a combination of formal education, and hands-on experience to ensure safety and competency in the field. Becoming a professional in electrical installation involves completing vocational training in electrical installation.

The Electrical Installation Syllabus is designed to guide the teaching and learning of Electrical Installation at Ordinary Secondary Education Form I-IV Vocational Stream in the United Republic of Tanzania. The syllabus interprets the competencies a student needs to develop while learning Electrical Installation. It contains valuable information that will enable teachers to effectively plan their teaching process and help learners develop the intended competencies.

## 2.0. Main Objectives of Education in Tanzania

The main objectives of education in Tanzania are to enable every Tanzanian to:

- (a) Develop and improve his or her personality so that he or she values himself or herself and develops self-confidence;
- (b) Respect the culture, traditions, norms, and customs of Tanzania; cultural differences; dignity; human rights; attitudes and inclusive actions;
- (c) Advance knowledge and apply science and technology, creativity, critical thinking, innovation, cooperation, communication, and positive attitudes for his or her development and the sustainable development of the nation and the world at large;
- (d) Understand and protect national values, including dignity, patriotism, integrity, unity, transparency, honesty, accountability and the national language;
- (e) Develop life and work-related skills to increase efficiency in everyday life;
- (f) Develop a habit of loving and valuing work to increase productivity and efficiency in production and service provision;
- (g) Identify and consider cross-cutting issues, including the health and well-being of the society, gender equality, as well as the management and sustainable conservation of the environment; and
- (h) Develop national and international cooperation, peace, and justice per the Constitution of the United Republic of Tanzania and international conventions.

## 3.0. General Competencies for Ordinary Secondary Education Vocational Stream

The general competencies for Ordinary Secondary Education, Form 1–IV, Vocational Education stream are to:

- (a) Apply the knowledge, skills, and attitudes the student developed in the primary school stage to increase his/her understanding of technical skills;
- (b) Appreciate citizenship and national virtues;
- (c) Use language skills;
- (d) Demonstrate self-confidence in learning in various fields, including science and technology, technical knowledge and technical skills;
- (e) Apply technical knowledge and skills in designing, discovering, and making various things to solve challenges in society, including cross-cutting issues;
- (f) Appreciate procedures and safety rules in using technical tools correctly; and
- (g) Apply the technical knowledge and skills acquired to develop oneself with vocational and technical education and join the workforce.

## 4.0. General Competencies of the Occupation

Upon completion of this occupation, students are expected to have the ability to:

- (a) Perform electrical joints,
- (b) Install cables and cable enclosures,
- (c) Construct a power supply circuit,
- (d) Draft and operate wiring circuit,
- (e) Install electrical machines, switch gears and protective devices,
- (f) Perform PLC programming,
- (g) Install and maintain solar PV systems,
- (h) Rewind Electric Motors and armature

# 5.0. Main and Specific Competencies

The main and specific competencies to be developed are presented in Table 1.

 Table 1: Main and Specific Competencies for Form I-IV
 Particular
 Particular

Main Competence	Specific competence
1.0 Maintaining health, safety, and environment at the	1.1 Handling workshop safety.
workplace.	1.2 Handling workshop tools.
	1.3 Handling workshop equipment.
	1.4 Carrying out health and safety investigation.
	1.5 Handling fire aaccidents.
	1.6 Performing First Aid.
	1.7 Maintaining buildings.
	1.8 Maintaining safe working environment.
2.0 Performing basic workshop activities.	2.1 Performing machine operations.
	2.2 Performing forming operations.
	2.3 Performing surface finishing operations.
	2.4 Performing bearing removal and mounting.
3.0 Building simple DC circuits.	3.1 Constructing resistive circuits.
	3.2 Constructing capacitive circuits.
	3.3 Constructing inductive ccircuits.
	3.4 Constructing RLC circuits.
	3.5 Measuring electrical quantities.
	3.6 Determining characteristics of active electronic components.
	3.7 Constructing rectifier ccircuits.
4.0 Performing preventive maintenance of tools,	4.1 Performing preventive maintenance of electrical tools.
equipment and machines.	4.2 Performing maintenance of electrical equipment.
	4.3 Performing preventive maintenance of simple electric
	machines.
5.0 Performing basic electrical installation.	5.1 Performing cold electrical joint.
	5.2 Performing soldering.
	5.3 Installing lighting circuits.
	5.4 Installing power circuits.
	5.5 Installing alarm and signal circuits.
	5.6 Installing basic protective devices.
	5.7 Carrying out system earthing.
	5.8 Carrying out electrical tests.
6.0 Building simple AC circuits.	6.1 Constructing simple heating coils.
	6.2 Constructing simple magnetic circuits.
	6.3 Constructing simple filter circuits.
7.0 Installing cables and cable enclosures.	7.1 Installing cables.

Main Competence	Specific competence
	7.2 Erecting conduits.
	7.3 Erecting trunking and cable trays.
	7.4 Constructing ducts and trenches.
8.0 Installing switch gears and protective devices.	8.1 Installing three-phase switch gears.
	8.2 Installing three-phase protective devices.
	8.3 Performing metering and tariffing.
	8.4 Installing fire detection and alarm system.
9.0 Installing solar electrical systems.	9.1 Installing solar electric system
	9.2 Servicing solar electric system.
10.0 Performing maintenance of electrical systems.	10.1 Carrying out preventive maintenance.
	10.2 Carrying out corrective maintenance.
	10.3 Carrying out condition-based maintenance.
	10.4 Carrying out troubleshooting.
Project	
11.0 Performing illumination tasks.	11.1 Performing light level assessment.
	11.2 Installing special lighting system.
12.0 Installing electrical machine.	12.1 Installing AC machines.
	12.2 Installing control system of AC machines.
	12.3 Installing DC machines.
	12.4 Installing control system of DC machines.
	12.5 Installing electronic soft starter.
13.0 Servicing electric machines.	13.1 Performing rewinding of electric motors.
	13.2 Performing rewinding of transformers.
14.0 Installing Programmable Logic Controllers	14.1 Installing PLCs components/accessories.
(PLCs).	14.2 Performing PLCs programming.
	14.3 Installing PLCs networking and communication system.
	14.4 Installing lift and escalator systems.
15.0 Managing resources.	15.1 Establishing tools, equipment and material profile.
	15.2 Planning for Maintenance.
	15.3 Estimating materials and labour costs.
	15.4 Preparing a small-scale tender document.
	15.5 Training subordinates on the job.
	15.6 Supervising subordinates.
16.0 Managing safe Working Environment	16.1 Managing hazards.
	16.2 Carrying out risk assessment.
	16.3 Managing environment
17.0 Managing proventive maintenance and the	17.1 Planning proventive maintenance
17.0 Managing preventive maintenance works	17.1 Flanning preventive maintenance
	17.2 Supervising preventive maintenance

## 6.0. The Roles of Teachers, Students, and Parents in Teaching and Learning

Good relationships between a teacher, student's parent or guardian are fundamental to ensuring successful learning. This section outlines the roles of each participant in facilitating effective teaching and learning of Electrical Installation.

## 6.1 The teacher

The teacher is expected to:

- (a) Help the student to learn and develop the intended competencies in Technical Drawing;
- Use teaching and learning approaches that will allow students with different needs and abilities to develop the competencies needed in the 21<sup>st</sup> Century, and actively participate in the teaching and learning process;
- (c) Use student-centered instructional strategies that make the student a centre of learning to allow them think, reflect, and search for information from various sources;
- (d) Create a friendly teaching and learning environment;
- (e) Prepare and improvise teaching and learning resources;
- (f) Conduct formative assessment regularly using tools and methods that assess theory and practice;
- (g) Treat all the students according to their learning needs and abilities;
- (h) Protect the student from the risky environment while he or she is at school;
- (i) Keep track of the student's daily progress;
- (j) Identify individual student's needs and provide proper intervention;
- (k) Involve parents/guardians and the society at large in the student's learning process; and
- (l) Integrate cross-cutting issues and ICT in the teaching and learning process.

## 6.2 The student

The student is expected to:

- (a) Develop the intended competencies by participating actively in various learning activities inside and outside the classroom; and
- (b) Participate in the search for knowledge from various sources, including textbooks, reference books, and other publications in online libraries.

## 6.3 The parent/guardian

The parent/Guadian is expected to:

- (a) Monitor the child's academic progress in school;
- (b) Where possible, provide a child with the needed academic support;
- (c) Provide a child with a safe and friendly home environment which is conducive for learning;
- (d) Keep track of a child's progress in behaviour;
- (e) Provide the child with any necessary materials required in the learning process; and
- (f) Instill in a child a sense of commitment and positive value towards education and work.

## 7.0. Teaching and Learning Methods

The teaching and learning methods are instrumental in developing student's competencies. This Syllabus suggests teaching and learning methods for each activity, which includes but is not limited to demonstration, practical/hands-on activities, observations, role play, simulation, group works, peer teaching/learning, discussions, presentations, field visits, research, and project works. However, a teacher is advised to plan and use other appropriate methods based on the environment or context. All the teaching and learning methods should be integrated with the everyday lives of students. The focus is expected to be on practical application and developing cognitive, affective, and psychomotor skills through learner-centred methods. Vocational teachers act as facilitators, incorporating both schoolbased teaching and project work supervision.

## 8.0. Teaching and Learning Resources

The process of teaching and learning requires different resources. In that regard, both a teacher and students should work together to collect or improvise alternative resources available in the school and home environment when needed. Teachers and students are expected to constantly seek information from various sources to effectively facilitate the teaching and learning process. The list of approved textbooks and reference books shall be provided by TIE.

### 9.0. Assessment

Assessment is important in teaching and learning about Electrical installation. It is divided into formative and summative assessments. Formative assessment informs both the teacher and students on the progress of teaching and learning, and in making decisions on improving the teaching and learning process. Teachers are, therefore, expected to apply a wide range of formative assessment methods which include but are not limited to demonstrations, discussions, presentations, oral questions, experiments, observations, practical assignments, and projects.

Summative assessment, on the other hand, will focus on determining student's achievement of learning. Teachers are expected to use a variety of summative assessments including Form Two National Assessment, terminal examination, annual examination, mock examination, and project. The scores obtained from these assessments will be used as Continuous Assessment (CA). Therefore, the continuous assessments shall contribute 60% and the National Form IV Examination shall be 40% as indicated in Table 2.

### 9.1 Project work

Project work is a carefully planned and clearly defined task or problem that a student undertakes, either alone or in a group, to enhance and apply the skills and knowledge gained in the classroom, workshop, kitchen, or laboratory. It is based on the principles of "Learning by Doing" and "Learning by Living." In this context, the implementation of Project Work in secondary schools' vocational streams is essential. Projects in the vocational stream should be conducted in the core subject (occupation). To ensure its success, the supervision and assessment of student project work must be consistent with the established guidelines provided by the National Examinations Council of Tanzania (NECTA).

Assessment Category	Weight (%)	National Examination
Form Two National Assessment (FTNA)	6.0	
Form Three Terminal Examination	5.0	
Form Three Anual Examination	5.0	
Form Four Mock Examination	7.0	40.0
Project	7.0	
Form Two Practical	10.0	
Form Three Practical	10.0	
Form Four Practical	10.0	
Total	60.0	1

Table 1: Contribution of Continuous Assessment and National Examination in the final score

## **10.0** Number of Periods

The Electrical Installation Syllabus for the Ordinary Secondary Education vocational stream Form I-IV provides a detailed framework for the estimated time dedicated to teaching and learning. This estimation considers the complexity of the specific competencies required and the various learning activities involved in mastering these skills. To ensure thorough coverage of the material, the syllabus allocates five (05) instructional periods each week, with each period lasting for 40 minutes, whereby two (02) periods will be

used for theory and three (03) for practical sessions. This structure allows for a comprehensive and engaging educational experience in electrical installation.

## **11.0** Teaching and Learning Contents

The contents of the Syllabus are organised into a matrix with seven (07) columns which are main competencies, specific competencies, learning activities, suggested teaching and learning methods, assessment criteria which are divided into (process assessment, products/service assessment, and underpinning knowledge), suggested teaching and learning resources, and a number of periods as presented in Table 3 to 6.

# Form One

## Table 2: Detailed contents for Form One

Module Title	Unit Title	Flowerta	Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	(Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
1.0 Maintaining health, safety, and environment at the workplace.	1.1 Handling workshop safety rules.	(a) Maintaining Workshop Safety Rules.	<ul> <li>Brainstorm: Guide the student to define workshop safety rules.</li> <li>Practical work: Guide the student on how to apply workshop safety rules.</li> <li>Group discussion: Guide the student to discuss ways of maintaining workshop safety rules.</li> </ul>	<ul> <li>The student</li> <li>should be able to:</li> <li>Make periodic inspections of the workshop and surroundings.</li> <li>Maintain workshop rules at their workshops.</li> <li>Apply safety rules.</li> </ul>	The safety of the workshop is maintained as per safety rules and regulations.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to maintain workshop safety rules. Principles: The student should explain pprinciples related to maintaining workshop safety rules. Theories: The student should explain: - The need of maintaining workshop safety rules. The iimportance of using correct tools for a	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available</li> <li>Complete tool kit</li> <li>PPE</li> <li>Warning signs</li> <li>Warning tapes</li> </ul>	18

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
						given work.		
		(c) Maintaining personal safety.	<ul> <li>Brainstorm: Guide the student to define personal safety.</li> <li>ICT-based Learning:</li> <li>Prepare relevant videos showing basic principles of maintaining personal safety.</li> <li>Guest speaker: Invite a resource person from OSHA to present how to maintain personal safety.</li> </ul>	<ul> <li>The student</li> <li>should be able to:</li> <li>Make periodic inspections of the workshop and surroundings.</li> <li>Maintain personal safety at their workshops.</li> <li>Apply personal safety.</li> </ul>	Personal Safety is maintained as per safety rules and regulations.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to maintain personal safety. Principles: The student should explain Principles related to maintaining personal safety. Theories: The student should explain: - • Need to maintain personal safety. Importance of using correct tools for a given work.	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Complete tool kit</li> <li>PPE</li> <li>Warning signs</li> <li>Warning tapes</li> <li>Video clip</li> <li>Projector</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/		
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested of Resources Po po	Suggested of Resources Peri per	of Periods per Unit
						<ul> <li>Knowledge evidence Detailed knowledge of:</li> <li>Method used: The student should explain how to maintain personal hygiene.</li> <li>Principles: The student should explain pprinciples related to maintaining personal hygiene.</li> <li>Theories: The student should explain: -</li> <li>The need to maintain personal hygiene.</li> <li>The iimportance of using correct tools for a given work.</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Tool ccabinet • Overall • Safety goggles • Leather gloves • Safety boots • Mask • Ear muff • Personal hygiene kit • Projector		

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
	1.2 Handling Workshop tools.	(a) Classifying tools.	<ul> <li>Group discussion: Guide students to present their work from the literature on how to classify tools.</li> <li>Internet and Library: Guide the student to search for relevant information on how to classify tools.</li> <li>Field practical: Guide students in groups or individual to visit a school general store to classify electrical</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and safety gears.</li> <li>Classify tools according to functions.</li> <li>Observe safety precautions</li> <li>Clean tools, equipment, safety gear, and workplace.</li> </ul>	Workshop tools classified as per their function.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to classify tools.</li> <li>Principles: The student should explain principles related to the classification of tools.</li> <li>Theories: The student should explain: -</li> <li>Different types of workshop tools.</li> <li>The importance of observing safety rules when using different tools.</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Electrician's tool kit</li> <li>Overall</li> <li>Helmet</li> <li>Safety goggles</li> <li>Leather gloves</li> <li>Safety boots</li> <li>Ear muffs</li> <li>General store</li> </ul>	17

Module Title	Unit Title		Suggested		Assessment Crite	eria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
		(b) Maintaining	tools.	The student	Workshop tools	Knowledge oridence:	This unit can be	
		workshop tools.	<ul> <li>Brainstorm: Guide the student to explain how to maintain workshop tools. hygiene.</li> <li>ICT-based learning: Prepare a relevant video showing the basic principles of maintaining workshop tools.</li> <li>Guest speaker: Invite an Engineer from iindustry to speak on how to maintain workshop</li> </ul>	<ul> <li>Select tools, equipment and safety gears.</li> <li>Maintain tools according to functions.</li> <li>Observe safety precautions.</li> <li>Clean tools, equipment, safety gear, and work place.</li> </ul>	worksnop tools maintained as per their function	<ul> <li><b>Detailed knowledge of:</b></li> <li><b>Method used:</b> The student should explain how to maintain tools.</li> <li><b>Principles:</b> The student should explain pprinciples related to maintaining workshop tools.</li> <li><b>Theories:</b> The student should explain: -</li> <li>The importance of keeping tools in optimum condition all the time.</li> <li>The importance of using well-maintained tools.</li> <li>Different types of workshop tools.</li> <li>The importance of observing safety when using different tools.</li> </ul>	<ul> <li>achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available</li> <li>Electrician's tool kit</li> <li>Overall</li> <li>Helmet</li> <li>Safety goggles</li> <li>Leather gloves</li> <li>Safety boots</li> <li>Ear muffs</li> <li>Video clip</li> <li>Projector</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			tools.					
	1.3 Handling workshop equipment.	(a) Classifying equipment.	<ul> <li>Group discussion Guides students to present their work from Literature on how to classify equipment.</li> <li>ICT-based Learning: Prepare a video clip on classifying equipment.</li> <li>Field visit: Organise students in groups or whole class to visit a nearby factory and classify equipment.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Classify workshop equipment according to functions.</li> <li>Observe safety precautions.</li> <li>Clean equipment, safety gear, and workplace.</li> </ul>	Workshop equipment is classified as per the manufacturer's manual.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to classify equipment. Principles: The student should explain pprinciples related to the classification of equipment. Theories: The student should explain: - Different types of workshop equipment. The importance of observing safety	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Electrical equipment</li> <li>Maintenance manual</li> <li>Overall</li> <li>Helmet</li> <li>Safety goggles</li> <li>Leather gloves</li> <li>Safety boots</li> <li>Mask</li> </ul>	17

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
		(b) Maintaining	• Group	The student	Workshop	when using different equipment. <b>Knowledge evidence:</b>	<ul> <li>Ear muff</li> <li>Video clip</li> <li>Projector</li> <li>This unit can be</li> </ul>	
		workshop equipment.	<ul> <li>discussion Guide students to present their work from Literature on how to maintain workshop equipment.</li> <li>ICT-based Learning: Prepare a video clip on classifying equipment.</li> <li>Field visit: Organise students in groups or whole class to visit a nearby factory to</li> </ul>	<ul> <li>Should be able to:</li> <li>Use <ul> <li>eequipment</li> <li>and safety</li> <li>gears.</li> </ul> </li> <li>Maintain <ul> <li>workshop</li> <li>equipment</li> <li>according to</li> <li>functions.</li> </ul> </li> <li>Observe safety <ul> <li>precautions.</li> </ul> </li> <li>Clean <ul> <li>equipment,</li> <li>safety gears</li> </ul> </li> </ul>	equipment maintained as per the manufacturer's manual.	<ul> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to maintain workshop equipment.</li> <li>Principles: The student should explain principles related to maintaining of equipment.</li> <li>Theories: The student should explain: -</li> <li>Different types of</li> </ul>	<ul> <li>achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Electrical equipment</li> <li>Maintenance manual</li> <li>Overall</li> <li>Helmet</li> <li>Safety goggles</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
	1.4 Carrying out	(a) Classifying	study how to maintain workshop equipment. • Group	and work place. The student	Accident and	workshop equipment. • The importance of maintaining workshop equipment Knowledge evidence:	<ul> <li>Leather gloves</li> <li>Safety boots</li> <li>Mask</li> <li>Ear muff</li> <li>This unit can be</li> </ul>	36
	health and safety investigations.	accidents.	<ul> <li>discussion Guide students to present their work from Literature on how to classify equipment.</li> <li>ICT-based Learning: Prepare a video clip on classifying equipment.</li> <li>Field visit: Organise students in groups or whole class to visit a nearby</li> </ul>	<ul> <li>should be able to:</li> <li>Handle accidents.</li> <li>Observe safety precautions.</li> <li>Clean tools, equipment, safety gears and work place.</li> <li>Store tools, equipment and safety gear.</li> </ul>	incident handled as per the specified Standards of OSHA.	Detailed knowledge of: Method used: The student should explain how to classify accidents. Principles: The student should explain principles related to classifying accidents. Theories: The student should explain: - • Causes of accidents. • Advantages of preventing	<ul> <li>achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available First aid box</li> <li>Overalls</li> <li>Hand gloves</li> <li>Masks</li> <li>Ear muffs</li> <li>Safety glasses</li> <li>Safety boots</li> <li>Helmets</li> <li>Fire extinguishers</li> <li>Electric ladders</li> <li>Occupational Safety and</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	(Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			factory to learn how to classify accidents.			accidents. Circumstantial knowledge: Detailed knowledge about: • Safety measures involved in handling accidents and incidents.	Health Authority (OSHA) rules and regulations	
		(b) Identify hazards	<ul> <li>Group discussion Guide students to present their work from Literature on how to identify hazards.</li> <li>ICT-based Learning: Prepare a video clip on identifying hazards.</li> <li>Field visit: Organise students in</li> </ul>	<ul> <li>The student</li> <li>should be able to:</li> <li>Identify hazards.</li> <li>Handle hazards.</li> <li>Observe safety precautions.</li> <li>Clean tools, equipment, safety gears and work</li> </ul>	Hazards identified as per the specified Standards of OSHA	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to identify hazards.</li> <li>Principles: The student should explain principles related to identifying hazards.</li> <li>Theories: The student should explain: -</li> <li>Causes of hazards.</li> <li>Advantages of preventing hazards.</li> <li>Hazards prevention methods.</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available First aid box</li> <li>Overalls</li> <li>Hand gloves</li> <li>Masks</li> <li>Ear muffs</li> <li>Safety glasses</li> <li>Safety boots</li> <li>Helmets</li> <li>Fire extinguishers</li> </ul>	

Module Title	Unit Title	El	Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	(Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			groups or whole class to visit a nearby factory and identify possible hazards that can happen in the factory.	<ul> <li>place.</li> <li>Store tools, equipment and safety gears.</li> </ul>		Circumstantial knowledge: Detailed knowledge about: Safety measures involved in handling accidents and incidents.	<ul> <li>Electric ladders</li> <li>Occupational Safety and Health Authority (OSHA) rules and regulations</li> </ul>	
		(c) Investigating accidents	<ul> <li>Group discussion Guide students to present their work from lliterature on how to investigate accidents</li> <li>ICT-based Learning: Prepare a video clip showing methods of investigating accidents.</li> <li>Field visit: Organise students in</li> </ul>	<ul> <li>The student should be able to:</li> <li>Identify accidents.</li> <li>Investigate accidents.</li> <li>Observe safety precautions.</li> <li>Clean tools, equipment, safety gears and work place.</li> <li>Store tools, equipment and safety gears.</li> </ul>	Accidents investigated as per the specified Standards of OSHA	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used:</li> <li>Method used: The student should explain how to investigate accidents.</li> <li>Principles: The student should explain principles related to accidents investigation.</li> <li>Theories: The student should explain: -</li> <li>Causes of accidents.</li> <li>Advantages of</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available First aid box</li> <li>Overalls</li> <li>Hand gloves</li> <li>Masks</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			groups or whole class to visit a nearby and learn how to investigate accidents.			investigating accidents. Circumstantial knowledge: Detailed knowledge about: Safety measures involved in investigating accidents and incidents.	<ul> <li>Ear muffs</li> <li>Safety glasses</li> <li>Safety boots</li> <li>Helmets</li> <li>Occupational Safety and Health Authority (OSHA) rules and regulations</li> <li>Video clip</li> <li>Projector</li> </ul>	
	1.5 Handling Fire Accidents	(a) Performing fire classification	<ul> <li>Group discussion Guide students to present their work from lliterature on performing fire classification</li> <li>ICT-based Learning: Prepare a</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment and safety gears.</li> <li>Identify classes of fire.</li> <li>Observe safety precautions.</li> <li>Clean tools, equipment, safety gears</li> </ul>	Fire types classification conform to OSHA standards	Knowledge evidence:Detailed knowledge of:Method used:The student should explain how to classify fire.Principles: The student should explain principles related to fire classification.	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Occupational Safety and Health Authority (OSHA) rules and regulations	23

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			video clip showing fire classification • Field visit: Organise students in groups or whole class to visit a Fire fighting station to learn more about the classification of fire.	and work place. • Store tools, equipment and safety gears		<ul> <li>Theories: The student should explain:</li> <li>Causes of fires.</li> <li>Fire triangle.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions while handling fire accidents.</li> <li>Awareness of OSHA rules and regulations.</li> <li>Properties of materials and chemicals</li> </ul>	<ul> <li>First aid box</li> <li>Electric ladder</li> <li>Safety boots</li> <li>Helmets</li> <li>Overalls</li> <li>Hand gloves</li> <li>Masks</li> <li>Ear muffs</li> <li>Safety glass</li> <li>Video clip</li> <li>Projector</li> </ul>	
		(b) Performing Firefighting	<ul> <li>Brainstorm: Guide students to explore the methods of firefighting.</li> <li>Field visit: Organise students in groups or whole class to visit a</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and safety gear.</li> <li>Classify fire extinguishers.</li> <li>Apply the right class of firefighting materials.</li> </ul>	Firefighting equipment is applied as per rules and regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>The method used: The student should explain how to perform firefighting.</li> <li>Principles: The student should explain principles related to firefighting.</li> </ul>	• is unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Firefighting rules and regulations	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			firefighting station. • ICT-based Learning: Prepare a video clip showing the basic principles of firefighting.	<ul> <li>Check and test fire extinguishers.</li> <li>Observe safety precautions.</li> <li>Clean tools, equipment, safety gear, and workplace.</li> <li>Store tools, equipment, and materials.</li> </ul>		<ul> <li>Theories: The student should explain:</li> <li>Causes of fires,</li> <li>Fire triangle.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions while handling fire accidents.</li> <li>Awareness of OSHA rules and regulations.</li> <li>Properties of materials and chemicals</li> </ul>	<ul> <li>manuals</li> <li>Occupational Safety and Health Authority (OSHA) rules and regulations</li> <li>First aid box</li> <li>Electric ladders</li> <li>Firefighting equipment</li> <li>Safety boots</li> <li>Helmets</li> <li>Overalls</li> <li>Hand gloves</li> <li>Masks</li> <li>Ear muffs</li> <li>Safety glasses</li> <li>Video clip</li> <li>Projector</li> </ul>	
		(c) Performing Fire Protection	<ul> <li>Brainstorm: Guide students to explore the methods of fire protection.</li> <li>Field visit: organise students in</li> </ul>	<ul> <li>The student</li> <li>should be able to:</li> <li>Identify inflammable materials.</li> <li>Classify inflammable material.</li> <li>Apply</li> </ul>	Fire protection equipment is identified and applied as per rules and regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>The method used: The student should explain how to perform fire protection.</li> <li>Principles: The student should explain</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available - • Firefighting rules and	

Module Title	Unit Title		Suggested		Assessment Crite	eria	Training Boguingmonts/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested C Resources I	of Periods per Unit
			<ul> <li>whole class to visit a firefighting station.</li> <li>ICT-based Learning: Prepare a video clip showing the basic principles of fire protection.</li> </ul>	<ul> <li>housekeeping manners to avoid fire.</li> <li>Observe safety precautions.</li> </ul>		<ul> <li>protection.</li> <li>Theories: The student should explain types of burning materials.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety measures in handling waste disposal</li> <li>Awareness of OSHA rules and regulations</li> <li>Properties of materials and chemicals</li> </ul>	regulations manuals Occupational Safety and Health Authority (OSHA) rules and regulations First aid box Electric ladders Firefighting equipment Safety boots Helmets Overalls Hand gloves Masks Ear muffs Safety glasses	
	1.6 Performing First Aid	(a) Maintaining first aid.	<ul> <li>Brainstorm: Guide students to explore the importance of first aid in the working workplace.</li> <li>Guest Speaker: Invite a nurse to</li> </ul>	<ul> <li>The student</li> <li>should be able to:</li> <li>Select tools, eequipment, and safety gears.</li> <li>Locate first aid kit.</li> <li>Identify first aid</li> </ul>	First aid maintained as per rules and regulations.	Knowledge evidence:Detailed knowledge of:The method used: The trainee should explain how to maintain first aid.Principles: The student should explain principles related to	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available First aid kits • Safety boots • Stretcher	26

Module Title	Unit Title	Elemente	Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	(Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			<ul> <li>present the role of first aid in a workplace.</li> <li>ICT-based learning: Prepare a video clip showing the basic principles of giving first aid to an injured person.</li> </ul>	<ul> <li>requirements.</li> <li>Report to superiors.</li> <li>Record accidents as per rules and regulations.</li> <li>Observe safety precautions.</li> <li>Clean tools, equipment, safety gear, and work place.</li> <li>Store tools and equipment.</li> </ul>		<ul> <li>maintaining first aid.</li> <li>Theories: The student should explain: -</li> <li>The basic principles for maintaining first aid.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety requirements</li> <li>Environmental requirements</li> </ul>	<ul> <li>Safety glasses</li> <li>Rubber gloves</li> <li>Overalls</li> <li>Ear muffs</li> <li>Masks</li> <li>Electric Ladders</li> <li>Video clip</li> <li>Projector</li> </ul>	
		(b) Performing artificial respiration	<ul> <li>Brainstorm: Guide students to explore the importance of first aid in the workplace.</li> <li>Guest Speaker: Invite a nurse to present the</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, eequipment, and safety.</li> <li>Identify first aid requirements.</li> <li>Take necessary steps to perform artificial</li> </ul>	Artificial respiration is performed as per acceptable hygienic methods and regulations	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>The method used: The student should explain how to perform artificial respiration.</li> <li>Principles: The student should explain principles related to performing artificial respiration.</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>First aid kits</li> <li>Safety boots</li> <li>Stretcher</li> <li>Safety glasses</li> <li>Rubber gloves</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			<ul> <li>way of performing artificial respiration.</li> <li>ICT-based learning: Prepare a video clip showing the basic principles of performing artificial respiration for an unconscious person.</li> </ul>	<ul> <li>respiration.</li> <li>Report to superiors.</li> <li>Record accidents as per rules and regulations.</li> <li>Observe safety precautions.</li> <li>Clean tools, equipment, safety gear and workplace.</li> </ul>		<ul> <li>Theories: The student should explain: -</li> <li>The basic principles of emergency life support.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety requirements</li> <li>Environmental requirements</li> </ul>	<ul> <li>Overalls</li> <li>Ear muffs</li> <li>Masks</li> <li>Electric ladders</li> </ul>	
		(c) Performing first aid to minor injuries	<ul> <li>Brainstorm: Guide students to explore the importance of first aid in the workplace.</li> <li>Guest Speaker: Invite a nurse to present how to perform first aid to</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment and safety gears.</li> <li>Locate first aid kit.</li> <li>Identify first aid requirements.</li> <li>Take necessary steps to perform first</li> </ul>	First aid for minor injury is performed as per hygienic regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>The method used: The student should explain how to maintain first aid.</li> <li>Principles: The student should explain principles related to maintaining first aid.</li> <li>Theories: The student</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>First aid kits</li> <li>Safety boots</li> <li>Stretcher</li> <li>Safety glasses</li> </ul>	

Module Title	Title Unit Title Elements Suggeste			gested Assessment Criteria			Training Requirements/	
(Main Competency )	(Specific Competencies)	(Learning Activities)	Learning Cetivities) Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			<ul> <li>minor injuries.</li> <li>ICT-based learning: Prepare a video clip showing the basic principles of performing first aid to a minor injury.</li> </ul>	<ul> <li>aid to a minor injury.</li> <li>Report to superiors.</li> <li>Record accidents as per rules and regulations.</li> <li>Observe safety precautions.</li> </ul>		<ul> <li>should explain: -</li> <li>The basic principles of performing first aid to a minor injury.</li> <li>Treatment for burns.</li> <li>Treatment for joint injuries.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety requirements</li> <li>Firefighting techniques</li> <li>Environmental requirements</li> </ul>	<ul> <li>Rubber gloves</li> <li>Overalls</li> <li>Ear muffs</li> <li>Masks</li> <li>Electric ladders</li> </ul>	
	1.7 Maintaining buildings	(a) Performing the arrangement of fittings and fixtures to the building.	<ul> <li>Brainstorm: Guide students to explore how to perform arrangements of fittings and fixtures to the building.</li> <li>Practical</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and safety gear.</li> <li>Assess the deterioration of the building.</li> </ul>	Fittings and fixtures are arranged in the building as per the layout plan.	Knowledge evidence: Detailed knowledge of: The method used: The student should be able to explain how to perform the arrangement of fittings and fixtures in the buildings.	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Brooms</li> <li>Wheelbarrow</li> </ul>	14

Module Title	Unit Title		Suggested	Assessment Criteria			Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			<ul> <li>work: Guide the student to follow procedures for making fittings and fixture arrangements in the building.</li> <li>Activity: Divide the students into groups to identify steps in arranging fittings and fixtures in the building.</li> </ul>	<ul> <li>Perform maintenance.</li> <li>Observe safety precautions.</li> <li>Clean tools, equipment safety gear, and workplace.</li> </ul>		Principles: The student should explain principles related to performing the arrangement of fittings and fixtures in the building.Theories: The student should explain: -The importance of building maintenance.Circumstantial knowledgeDetailed knowledge about:• Safety measures involved in building maintenance	<ul> <li>Spades</li> <li>Rakes</li> <li>Polyethylene bags</li> <li>Incinerator</li> <li>Overalls</li> <li>Dust Bin</li> <li>Gloves</li> <li>Masks</li> <li>Dust collectors</li> <li>Cobweb brushes</li> <li>Window wiper</li> <li>Floor squeezers</li> <li>Mopping equipment</li> <li>Safety boots</li> </ul>	
		(b) Performing interior and exterior cleanness	• Internet and Library: Guide the student to search for relevant information on the interior and	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and safety gear.</li> <li>Perform interior and</li> </ul>	Building's internally and externally cleaned as per standard.	Knowledge evidence: Detailed knowledge of: The method used: The student should be able to explain how to perform interior and exterior cleanliness. Principles: The student	• This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available	

Module Title	odule Title		Suggested	Assessment Criteria			Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			<ul> <li>exterior cleanliness of a building.</li> <li>ICT-based Learning: Prepare relevant videos showing basic principles of how to clean the exterior and interior parts of a building.</li> <li>Group discussion Guide the student to present their works from the literature on the exterior and interior cleanliness of a building.</li> </ul>	<ul> <li>exterior cleanliness of the building.</li> <li>Observe safety precautions.</li> <li>Clean tools, equipment safety gear, and workplace.</li> </ul>		<ul> <li>should explain principles related to performing interior and exterior cleanliness.</li> <li>Theories: The student should explain: -</li> <li>The importance of building cleanliness.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety measures involved in building maintenance</li> <li>Safe storage of tools and equipment</li> </ul>	<ul> <li>Brooms</li> <li>Wheel barrow</li> <li>Spades</li> <li>Rakes</li> <li>Polyethylene bags</li> <li>Overalls</li> <li>Dust bins</li> <li>Gloves</li> <li>Masks</li> <li>Dust collectors</li> <li>Cobweb brushes</li> <li>Safety boots</li> <li>Video clip</li> <li>Projector</li> </ul>	
	1.8 Maintaining a	(a) Maintaining	Brainstorm:	The student	Work	Knowledge evidence:	This unit can be	26
	environment	worksnop Safety	student to	<ul> <li>Select relevant</li> </ul>	maintained as per safety rules and	Detailed knowledge of:	workplace or training institution	

Module Title	Unit Title (Specific Competencies)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/	Number
(Main Competency )				Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			<ul> <li>importance of workshop safety.</li> <li>Guest speaker: Invite a guest speaker from TEMESA to lecture on maintaining workshop safety.</li> <li>Field visit: Organise in a group or whole class to visit a nearby workshop to learn how the workshop is maintained.</li> </ul>	<ul> <li>safety gears.</li> <li>Maintain workshop safety environment.</li> <li>Observe safety precautions.</li> <li>Clean, tools, equipment, safety gear, and workplace.</li> </ul>	regulations	<ul> <li>The method used: The student should be able to explain how to maintain workshop safety.</li> <li>Principles: The student should explain principles related to maintaining workshop safety.</li> <li>Theories: The student should explain: -</li> <li>Different safety signs and their importance.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>OSHA rules and regulations</li> <li>Waste disposal procedure</li> <li>Workshop rules and regulations</li> </ul>	The following tools, safety gear, and equipment are to be available : • Safety boots • Hand gloves • Overalls	
		(b) Drawing safety signs.	• Internet and Library search:	The student should be able to:	Safety signs are drawn as per specified	Knowledge evidence: Detailed knowledge of:	• This unit can be achieved at the workplace or	
Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
-----------------------	----------------------------	--------------------------------------	---	---	----------------------------------	--	--	---------------------------
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			<ul> <li>Guide the student to search for relevant information on drawing safety signs.</li> <li>ICT-based Learning: Prepare relevant videos showing how to draw safety signs.</li> <li>Field practical: Guide the student in groups or individual to apply tools to draw safety signs.</li> </ul>	<ul> <li>Select relevant safety gears.</li> <li>Maintain a safe work environment.</li> <li>Observe safety precautions.</li> <li>Clean, tools, equipment, safety gear, and workplace.</li> </ul>	standards.	<ul> <li>The method used: The student should be able to explain how to draw safety signs.</li> <li>Principles: The student should explain principles related to drawing safety signs.</li> <li>Theories: The student should explain: -</li> <li>Different safety signs and their importance.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>OSHA rules and regulations</li> <li>Safe working practices</li> <li>Waste disposal procedure</li> <li>Workshop rules and regulations</li> </ul>	training institution. The following tools, safety gear, and equipment are to be available Safety boots Hand gloves Overalls Video clip Projector	
		(c) Handling	Internet and Library	The student	Waste handled as per OSHA safety	Knowledge evidence:	This unit can be achieved at the	

Module Title	Unit Title	El	Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	(Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
		Waste.	<ul> <li>search: Guide the student to search for relevant information on handling waste.</li> <li>ICT-based Learning: prepare relevant videos showing how to handle waste.</li> <li>Field practical: Guide the student in groups or individuals to apply tools to handle waste.</li> </ul>	<ul> <li>should be able to:</li> <li>Select relevant safety gears.</li> <li>Maintain workshop safety environment.</li> <li>Take precautions against health and safety hazards.</li> <li>Maintain safe work environment.</li> <li>Observe safety precautions.</li> <li>Clean, tools, equipment, safety gear and workplace.</li> <li>Store tools, equipment, and safety gears.</li> </ul>	rules and regulations.	<ul> <li>Detailed knowledge of:</li> <li>The method used: The student should be able to explain how to maintain or handle waste.</li> <li>Principles: The student should explain principles related to handling waste.</li> <li>Theories: The student</li> <li>should explain: -</li> <li>Methods of disposing of different types of wastes.</li> <li>The classification of wastes and their hazards.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>OSHA rules and regulations</li> <li>Waste disposal procedure</li> </ul>	<ul> <li>workplace or training institution. The following tools, safety gear, and equipment are to be available Safety boots</li> <li>Hand gloves</li> <li>Overalls</li> <li>Dust mask</li> <li>Rake</li> <li>Dust bins</li> <li>Mop bucket</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
						Workshop rules and regulations		
2. Performing basic workshop activities.	2.1 Performing machine operations.	(a) Performing metal grinding.	<ul> <li>ICT-based Learning: prepare relevant videos showing procedures for performing metal grinding.</li> <li>Field visit: Organise students in groups or whole classes to visit a nearby workshop where metal grinding is done.</li> <li>Field practical: Guide students in groups or individuals to apply the method of</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret the drawing.</li> <li>Select the material, tools, and equipment.</li> <li>Mark the work piece.</li> <li>Clamp the work piece on a vice.</li> <li>Mark the start grooves with a triangle file</li> <li>Remove sharp edges with a file.</li> <li>Measure accuracy.</li> <li>Apply safety measures.</li> <li>Clean the work pieces, and tools.</li> </ul>	Metal sheet grinding is performed as per the given specifications and standards.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The trainee should explain how to perform metal grinding</li> <li>Principles: The student should explain principles related to performing metal grinding</li> <li>Theories: The trainee should explain:</li> <li>Types of grinding stones and their functions.</li> <li>Circumstantial knowledge:</li> <li>Detailed knowledge about:</li> <li>Preventive maintenance of tools, equipment, and machines.</li> <li>Properties of</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Workbench</li> <li>Bench vice</li> <li>Video clip</li> <li>Projector</li> <li>Radius gauges</li> <li>Spring divider</li> <li>Video clips</li> <li>Leather gloves</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety glasses</li> </ul>	60

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			metal grinding seen in the field visit.			material		
		(b) Performing hole drilling.	<ul> <li>ICT-based Learning: Prepare relevant videos showing procedures for performing metal grinding.</li> <li>Field visit: Organise students in groups or whole classes to visit a nearby workshop where metal grinding is done.</li> <li>Field practical: Guide students in groups or</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret the drawing.</li> <li>Select the material, tools and equipment.</li> <li>Mark the work piece.</li> <li>Clamp the work piece on a vice.</li> <li>Perform drilling.</li> <li>Remove sharp edges with a file.</li> <li>Take measurement for accuracy.</li> <li>Apply safety measures.</li> <li>Clean the work piace, work piece and tools.</li> </ul>	Hole drilling is performed as per technical specifications.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The student should explain how to perform hole drilling.</li> <li>Principles: The student should explain principles related to hole drilling</li> <li>Theories: The trainee should explain:</li> <li>Types of drill bit and their functions.</li> <li>Main parts of a drill bit.</li> <li>Circumstantial knowledge:</li> <li>Detailed knowledge about:</li> <li>Preventive maintenance of tools, equipment</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available</li> <li>Workbench</li> <li>Bench vice</li> <li>Try square</li> <li>Vernier calliper</li> <li>Steel rule</li> <li>Hacksaw</li> <li>Centre punch</li> <li>Oil can</li> <li>Radius gauges</li> <li>Spring divider</li> <li>Scriber.</li> <li>Scriber surface table.</li> <li>Leather gloves</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety glasses</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			to apply the method of metal grinding seen in the field visit.	• Store the work piece and tools.		<ul><li>and machines.</li><li>Environmental requirement.</li></ul>		
		( C) Performing thread-cutting.	<ul> <li>ICT-based Learning: Prepare relevant videos showing procedures for performing metal grinding.</li> <li>Field visit: Organise students in groups or whole class to visit a nearby workshop where metal grinding is done.</li> <li>Field practical:</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret the drawing.</li> <li>Select the material, tools, and equipment.</li> <li>Mark the workpiece.</li> <li>Clamp the workpiece on a vice.</li> <li>Mark the start grooves with a triangle file.</li> <li>Perform thread cutting.</li> <li>Remove sharp edges with a file.</li> <li>Measure accuracy</li> </ul>	Thread-cutting is performed as per technical specifications.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The student should explain how to perform thread-cutting.</li> <li>Principles: The student should explain principles related to performing thread-cutting.</li> <li>Theories: The trainee should explain:</li> <li>Types of thread-cutting tools and their functions.</li> <li>Main parts of a thread-cutting tool.</li> <li>Circumstantial</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Workbench</li> <li>Video clip</li> <li>Projector</li> <li>Oil can</li> <li>Radius gauges</li> <li>Spring divider</li> <li>Scriber surface table</li> <li>Leather gloves</li> <li>Overalls</li> <li>Safety glasses</li> <li>Threading machine</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			Guide students in groups or individuals to apply the method of metal grinding seen in the field visit.	<ul> <li>Apply safety measures.</li> <li>Clean the workplace, work pieces, and tools.</li> </ul>		<ul> <li>knowledge:</li> <li>Detailed knowledge about:</li> <li>Preventive maintenance of tools, equipment, and machines</li> <li>Properties of metal material</li> </ul>		
	2.2 Performing forming operation	(a) Perform metal cutting.	<ul> <li>ICT-based Learning: Prepare a video clip showing metal cutting procedures.</li> <li>Field visit: Organise students in a group or whole class to visit a nearby workshop where metal cutting is done.</li> <li>Group discussion: Guide</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret the drawing.</li> <li>Select the material, tools, and equipment.</li> <li>Mark the workpiece.</li> <li>Clamp the workpiece on a vice.</li> <li>Mark the start grooves with a triangle file.</li> <li>Perform metal cutting.</li> <li>Remove sharp edges with a</li> </ul>	Metal-cutting is performed as per technical specifications.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The student should explain how to perform metal-cutting</li> <li>Principles: The student should explain principles related to performing metal-cutting</li> <li>Theories: The trainee should explain:</li> <li>Types of metal cutting tools and their functions.</li> <li>Main parts of a</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available</li> <li>Workbench</li> <li>Bench vice</li> <li>Try square</li> <li>Vernier calliper</li> <li>Steel rule</li> <li>Hacksaw</li> <li>Leather gloves</li> <li>Overalls</li> <li>Safety glasses</li> <li>Files</li> <li>Scriber</li> <li>Wire brush</li> </ul>	78

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			students to present a report from the field visit.	<ul> <li>file.</li> <li>Apply safety measures.</li> <li>Clean the workplace, work piece and tools.</li> </ul>		<ul> <li>metal cutting tool.</li> <li>Circumstantial knowledge:</li> <li>Detailed knowledge about:</li> <li>Preventive maintenance of tools, equipment and machines</li> <li>Properties of metal material</li> </ul>		
		(b) Performing metal shearing	<ul> <li>ICT-based Learning: Prepare a video clip showing metal shearing.</li> <li>Field visit: Organise students in a group or whole class to visit a nearby workshop where metal shearing is done.</li> <li>Group</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret the drawing.</li> <li>Select the material, tools, and equipment.</li> <li>Mark the work piece.</li> <li>Clamp the work piece on a vice.</li> <li>Mark the start grooves with a triangle file.</li> <li>Perform metal shearing</li> </ul>	Metal shearing is performed as per technical specifications.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The student should explain how to perform metal shearing</li> <li>Principles: The student should explain principles related to performing metal shearing</li> <li>Theories: The trainee should explain:</li> <li>Types of metal shearing tools and their functions.</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Workbench • Bench vice • Try square • Vernier calliper • Steel rule • Hacksaw • Leather gloves • Overalls • Safety boots	

Module Title	Unit Title		Suggested		Assessment Crite	eria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			discussion: Guide students to present a report from the field visit.	<ul> <li>Remove sharp edges with a file.</li> <li>Take measurements for accuracy.</li> <li>Apply safety measures.</li> <li>Clean the workplace, work pieces, and tools</li> </ul>		<ul> <li>Main parts of a metal shearing machine.</li> <li>Circumstantial knowledge:</li> <li>Detailed knowledge about:</li> <li>Preventive maintenance of tools, equipment, and machines</li> <li>Properties of metal material</li> </ul>	<ul> <li>Safety glasses</li> <li>Files</li> <li>Scriber</li> <li>Wire brush</li> <li>Shear machine</li> <li>Video clip</li> <li>Projector</li> </ul>	
		(c)Performing metal bending	<ul> <li>ICT-based Learning: Prepare a video clip showing metal bending procedures.</li> <li>Field visit: Organise students in a group or whole class to visit a nearby workshop where metal</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret the drawing.</li> <li>Select the material, tools and equipment.</li> <li>Mark the work piece.</li> <li>Clamp the work piece on a vice.</li> <li>Mark the start grooves with a triangle file.</li> </ul>	Metal bending is performed as per technical specifications.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The student should explain how to perform metal bending</li> <li>Principles: The student should explain principles related to performing metal bending</li> <li>Theories: The trainee should explain:</li> <li>Types of metal</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Workbench</li> <li>Bench vice</li> <li>Try square</li> <li>Vernier calliper</li> <li>Steel rule</li> <li>Leather gloves</li> <li>Overalls</li> <li>Safety boots</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			bending is done. • Group discussion: Guide students to present a report from the field visit.	<ul> <li>Perform metal bending.</li> <li>Remove sharp edges with a file.</li> <li>Apply safety measures.</li> <li>Clean the workplace, work pieces and tools</li> </ul>		<ul> <li>bending tools and their functions.</li> <li>Main parts of a metal bending machine.</li> <li>Circumstantial knowledge:</li> <li>Detailed knowledge about:</li> <li>Preventive maintenance of tools, equipment and machines</li> <li>Properties of metal material</li> </ul>	<ul> <li>Safety glasses</li> <li>Wire brush</li> <li>Manually/hydra ulic bending machine</li> <li>Video clip</li> <li>Projector</li> </ul>	
		(d) Constructing Sheet Metal Box	<ul> <li>ICT-based Learning: Prepare a video clip showing constructing sheet metal box</li> <li>Field visit: Organise students group or whole class to visit a nearby</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret the drawing.</li> <li>Select the material, tools, and equipment.</li> <li>Mark the work piece.</li> <li>Clamp the work piece on a vice.</li> <li>Construct</li> </ul>	The sheet metal box is performed as per technical specifications.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The student should explain how to construct sheet metal boxing</li> <li>Principles: The student should explain principles related to constructing sheet metal boxing.</li> <li>Theories: The trainee</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Workbench</li> <li>Bench vice</li> <li>Try square.</li> <li>Vernier calliper</li> <li>Steel rule</li> <li>Hacksaw</li> </ul>	

Module Title	Unit Title	El	Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	(Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested   G     Resources   I	of Periods per Unit
			workshop where sheet metal box is constructed. • Group discussion: Guide students to present a report from the field visit.	<ul> <li>Sheet metal boxing</li> <li>Remove sharp edges with a file.</li> <li>Take measurements for accuracy.</li> <li>Apply safety measures.</li> <li>Clean the workplace, workpieces, and tools</li> </ul>		<ul> <li>should explain:</li> <li>Types of cutting blade and their functions.</li> <li>Main parts of a hand saw frame.</li> <li>Hand sawing blade teeth arrangement.</li> <li>The uses of various tools and equipment.</li> <li>Circumstantial knowledge:</li> <li>Detailed knowledge about:</li> <li>Properties of materials</li> </ul>	<ul> <li>Leather gloves.</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety glasses</li> <li>Video clip</li> <li>Projector</li> </ul>	
	2.3 Performing surface finishing operation.	(a) Carrying out sanding.	<ul> <li>Group discussion: Guide the students to discuss the meaning of sanding.</li> <li>Field visit: Organise students in a group or whole class to visit a nearby</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select the material, tools, and equipment.</li> <li>Mark the work piece.</li> <li>Clamp the work piece.</li> <li>Perform</li> </ul>	Sanding for finishing a work piece carried out as per technical specifications.	Knowledge evidence:Detailed knowledge of the method used.The student should explain how to carry out sandingPrinciples:The student should explain principles related to sanding.	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Workbench • Bench vice • Metal belt	70

Module Title	Unit Title		Suggested		Assessment Crite	eria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			<ul> <li>workshop where sanding is performed.</li> <li>ICT-based Learning: Prepare a video clip showing the sanding process.</li> </ul>	surface finishing by sanding • Apply safety measures. • Clean the workplace and work piece.		<ul> <li>Theories: The trainee should explain:</li> <li>The uses of various tools and equipment used in the sanding.</li> <li>Types of sanding machines.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety requirements</li> <li>Properties of materials</li> <li>Mechanical and electrical hazards while sanding</li> </ul>	sanding machine Polishing belt sander Leather gloves Overalls Safety boots Safety glasses	
		(b)Carrying out filing	<ul> <li>Group discussion: Guide the students to discuss the meaning of sanding.</li> <li>Field visit: Organise students in a group or whole class to</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret the technical drawing.</li> <li>Select the material, tools, and equipment for filling</li> <li>Clamp the work piece.</li> </ul>	A work piece filed as per technical specifications.	Knowledge evidence:Detailed knowledge of the method used.The student should explain how to carry out filling.Principles: The student should explain principles related to	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available</li> <li>Workbench</li> <li>Bench vice</li> <li>Leather gloves</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number	
(Main Competency )	(Specific Competencies)	Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	Suggested of Resources Perio per U	of Periods per Unit
			<ul> <li>visit a nearby workshop where sanding is performed.</li> <li>ICT-based Learning: Prepare a video clip showing the sanding process.</li> </ul>	<ul> <li>Perform filling</li> <li>Apply safety measures.</li> <li>Clean the work place and work piece.</li> <li>Store the work piece, tools and equipment.</li> </ul>		<ul> <li>filling.</li> <li>Theories: The trainee should explain:</li> <li>Advantages of filling.</li> <li>Types of files.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety requirements</li> <li>Properties of materials Mechanical and electrical hazards while filling</li> </ul>	<ul> <li>Overalls</li> <li>Safety boots</li> <li>Safety glasses</li> <li>Metal file</li> <li>Metal workplace</li> </ul>		
		(c) Carrying out reaming	<ul> <li>Group discussion: Guide the students to discuss the meaning of sanding.</li> <li>Field visit: Organise students in a group or whole class to visit a nearby workshop where</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret the technical drawing.</li> <li>Select the material, tools and equipment for reaming.</li> <li>Clamp the work piece.</li> <li>Perform</li> </ul>	A work piece reamed as per technical specifications.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The student should explain how to carry out reaming.</li> <li>Principles: The student should explain principles related to reaming.</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Workbench</li> <li>Bench vice</li> <li>Reamer</li> <li>Leather gloves</li> </ul>		

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			<ul> <li>sanding is performed.</li> <li>ICT-based Learning:</li> <li>Prepare a video clip showing the sanding process.</li> </ul>	<ul> <li>reaming.</li> <li>Take measurement for accuracy.</li> <li>Apply safety measures.</li> <li>Clean the work place and work piece.</li> <li>Store the work piece, tools and equipment.</li> </ul>		<ul> <li>Theories: The trainee should explain:</li> <li>Advantages of reaming.</li> <li>Types of reamer.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety requirements</li> <li>Properties of materials</li> <li>Mechanical and electrical hazards while reaming</li> </ul>	<ul> <li>Overall</li> <li>Safety boots</li> <li>Safety glasses</li> <li>Manually/hydra ulic reaming machine</li> </ul>	
	2.4 Performing bearing removal and mounting.	(a) Mounting bearing manually.	<ul> <li>Group discussion: Guide the students to discuss the meaning of mounting bearings manually.</li> <li>Field visit: Organise students in a group or whole class to</li> </ul>	<ul> <li>The trainee should be able to:</li> <li>Select tools, equipment and safety gear.</li> <li>Prepare shaft onto which to fit bearing.</li> <li>Select bearing to be fitted.</li> <li>Mount bearing onto shaft.</li> </ul>	Mounting of bearing conforms to given instructions and manufacturer specifications	Knowledge evidence:Detailed knowledge of the method used.The student should explain how to mount bearing manuallyPrinciples: The student should explain principles related to mounting bearing manually.	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Workbench</li> <li>Bearing removal and mounting kit</li> </ul>	32

Module Title	Unit Title		Suggested		Assessment Crite	eria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			<ul> <li>visit a nearby workshop where mounting bearings manually.</li> <li>ICT-based Learning: Prepare a video clip showing the mounting bearing manual process.</li> </ul>	<ul> <li>Observe safety requirements.</li> <li>Clean the work place and work pieces.</li> <li>Store tools, equipment and safety gear.</li> </ul>		<ul> <li>Theories: The trainee should explain:</li> <li>Importance of using bearings in rotating machine parts.</li> <li>The use of various</li> <li>How to remove and mount bearings.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions while removing and mounting bearing</li> </ul>	<ul> <li>Puller</li> <li>Oil can</li> <li>Grease gun</li> <li>Bearing servicing kit</li> <li>Radius gauges</li> <li>Leather gloves</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety glasses</li> </ul>	
		(b)Mounting bearing Mechanically	<ul> <li>Group discussion: Guide the students to discuss the meaning of sanding.</li> <li>Field visit: Organise students in a group or whole class to visit a nearby workshop where sanding is</li> </ul>	<ul> <li>The trainee should be able to:</li> <li>Select tools, equipment and safety gear.</li> <li>Prepare the shaft onto which to fit the bearing.</li> <li>Select the bearing to be fitted.</li> <li>Mount the bearing onto</li> </ul>	Mounting of bearing mechanically conforms to given instructions and manufacturer specifications	Knowledge evidence:Detailed knowledge ofthe method usedThe student shouldexplain how to mountbearing mechanically.Principles: The studentshould explainprinciples related tomounting bearingmechanically.Theories: The trainee	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available</li> <li>Workbench</li> <li>Bearing removal and mounting kit</li> <li>Puller</li> <li>Oil can</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number	
(Main Competency )	(Specific Competencies)	Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	Suggested of Resources Per per	of Periods per Unit
			<ul> <li>ICT-based Learning:</li> <li>Prepare a video clip showing the sanding process.</li> </ul>	<ul> <li>the shaft.</li> <li>Observe safety requirements.</li> <li>Clean the work place and work pieces.</li> <li>Store tools, equipment and safety gear.</li> </ul>		<ul> <li>should explain:</li> <li>Importance of using bearings in rotating machine.</li> <li>How to mount bearings.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Preventive maintenance of tools, machines and equipment</li> <li>Environmental requirements</li> </ul>	<ul> <li>Grease gun</li> <li>Bearing servicing kit</li> <li>Radius gauges</li> <li>Leather glove.</li> <li>Overalls</li> <li>Safety boots</li> <li>Hydraulic press</li> <li>Safety glasses</li> </ul>		
		(c) Removing bearing Manually	<ul> <li>Group discussion: Guide the students to discuss the process of removing bearing manually.</li> <li>Field visit: Organise students in a group or whole class to visit a nearby</li> </ul>	<ul> <li>The trainee should be able to:</li> <li>Select tools, equipment and safety gear.</li> <li>Prepare the shaft for removing the bearing.</li> <li>Select the bearing to be removed.</li> <li>Remove the</li> </ul>	Removal of bearing conforms to given instructions and manufacturer specifications.	Knowledge evidence:Detailed knowledge ofthe method used:The student shouldexplain how to removethe bearingmechanically.Principles:The studentshould explainprinciples related toremoving bearings	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Workbench.</li> <li>Bearing removal and mounting kit</li> </ul>		

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			<ul> <li>workshop were removing bearing manually is performed.</li> <li>ICT-based Learning: Prepare a video clip of removing the bearing manually.</li> </ul>	<ul> <li>bearing from the shaft.</li> <li>Use a puller to remove the bearing from the shaft.</li> <li>Observe safety requirements.</li> <li>Clean the work place and work pieces.</li> <li>Store tools, equipment and safety gear.</li> </ul>		<ul> <li>mechanically.</li> <li>Theories: The trainee should explain: How to remove bearings.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Preventive maintenance of tools, machines and equipment</li> <li>Environmental requirements</li> </ul>	<ul> <li>Puller</li> <li>Oil can</li> <li>Grease gun</li> <li>Bearing servicing kit</li> <li>Radius gauges</li> <li>Leather gloves</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety glasses</li> <li>Video clip</li> <li>Projector</li> </ul>	
3.0 Building Simple DC Circuits.	3.1 Construction of a resistive circuit	(a) Building single resistor circuit.	<ul> <li>Brainstorm: Guide the students to define a resistor</li> <li>Practical work: Guide the student to identify types of resistor.</li> <li>Activity: Set the students in groups to</li> </ul>	Thestudentshould be able to:•Design acircuit diagramof the resistivecircuit.•Identifyequipment,tools, andmaterialsrequired.•Prepareresistors andcables for	The single resistive circuit is constructed as per electrical standards.	Knowledge evidence: Detailed knowledge of: The method used: The student should explain how to build a single- phase resistor circuit. Principles: The student should explain the principles related to building a single resistor.	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Safety gear</li> <li>Workbench</li> <li>Electronics board</li> </ul>	60

Module Title	Unit Title		Suggested		Assessment Crite	eria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			build single resistor circuit.	<ul> <li>termination.</li> <li>Build a single resistor circuit.</li> <li>Solder the built circuits.</li> <li>Apply safety precautions.</li> <li>Clean work area, tools and equipment.</li> <li>Store tools, equipment, and remained materials.</li> </ul>		<ul> <li>Theories: The trainee should explain:</li> <li>The Ohms' Law and its applications.</li> <li>Types of electrical materials.</li> <li>Electrical symbols used to construct the resistive circuit.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safe handling of working tools and equipment</li> <li>Electrical hazards</li> </ul>	<ul> <li>Soldering iron/gun</li> <li>Electrician's knife</li> <li>Combination pliers</li> <li>Multimeter</li> <li>Measuring tape</li> <li>Overalls</li> <li>Safety goggles</li> </ul>	
		(b) Building series circuit.	<ul> <li>Brainstorm: Guide the students to define a series resistor.</li> <li>Practical work: Guide the student to identify behaviour of</li> </ul>	<ul> <li>The student should be able to:</li> <li>Design a circuit diagram of the series resistive circuit.</li> <li>Identify equipment, tools, and</li> </ul>	The series resistive circuit is constructed as per electrical standards.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>The method used: The student should explain building a series resistor circuit.</li> <li>Principles: The student should explain the principles related to</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Workbench</li> <li>Electronics</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			<ul> <li>a series resistor.</li> <li>Activity: Set the students in groups to build a series resistor circuit.</li> </ul>	<ul> <li>materials required.</li> <li>Prepare resistors and cables for termination.</li> <li>Build a series of resistive circuits.</li> <li>Solder the built circuits.</li> <li>Apply safety precautions.</li> <li>Clean work area, tools and equipment.</li> <li>Store tools, equipment, and remaining materials.</li> </ul>		<ul> <li>building a series resistor circuit.</li> <li>Theories: The trainee should explain:</li> <li>The application of a series circuit.</li> <li>Electrical symbols used to construct the resistive circuit.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge</li> <li>Detailed knowledge about:</li> <li>Safe handling of working tools and equipment</li> <li>Electrical hazards</li> </ul>	<ul> <li>board</li> <li>Soldering iron/gun</li> <li>Electrician's knife</li> <li>Combination pliers</li> <li>Cutting pliers</li> <li>Long nose pliers</li> <li>Digital multimeter</li> <li>Measuring tape</li> <li>Overalls</li> <li>Safety goggles</li> </ul>	
		(c) Building parallel circuit.	<ul> <li>Brainstorm: Guide the student to define parallel resistor circuit.</li> <li>Practical work: Guide the student to identify</li> </ul>	<ul> <li>The student should be able to:</li> <li>Design a circuit diagram of the parallel resistive circuit.</li> <li>Identify equipment, tools, and materials</li> </ul>	The parallel circuit is constructed as per electrical standards.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>The method used: The student should explain building a parallel resistor circuit.</li> <li>Principles: The student should explain the principles related to</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Workbench</li> <li>Electronics</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			<ul> <li>behaviour of parallel resistor circuit.</li> <li>Activity: Set the students in groups to build a parallel resistor circuit.</li> </ul>	<ul> <li>required.</li> <li>Prepare resistors and cables for termination.</li> <li>Build a parallel resistive circuit.</li> <li>Solder the built circuits.</li> <li>Apply safety precautions.</li> <li>Clean work area, tools and equipment.</li> <li>Store tools, equipment, and remaining materials</li> </ul>		<ul> <li>building parallel resistor</li> <li>Theories: The trainee should explain:</li> <li>Application of parallel circuit.</li> <li>Electrical symbols used to construct the resistive circuit.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safe handling of work tools and equipment</li> <li>Electrical hazards.</li> </ul>	<ul> <li>board</li> <li>Soldering iron/gun</li> <li>Electrician's knife</li> <li>Combination pliers</li> <li>Cutting pliers</li> <li>Long nose pliers</li> <li>Digital multimeter</li> <li>Measuring tape</li> <li>Overalls</li> <li>Safety goggles</li> </ul>	
		(d) Building series-parallel resistive circuit.	<ul> <li>Brainstorm: Guide the student to define series- parallel resistor.</li> <li>Practical work: Guide the student to identify behaviour of</li> </ul>	<ul> <li>The student should be able to:</li> <li>Design a circuit diagram of the series-parallel resistive circuit.</li> <li>Identify equipment, tools, and</li> </ul>	The series- parallel resistive circuit is constructed as per electrical standards.	Knowledge evidence: Detailed knowledge of: The method used: The student should explain building a series- parallel resistor circuit. Principles: The student should explain the principles related to	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available</li> <li>Workbench</li> <li>Electronics</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			series- parallel resistor. • Activity: Set the students in groups to build a series- parallel resistor circuit.	<ul> <li>materials required.</li> <li>Prepare resistors and cables for termination.</li> <li>Build a series- parallel resistive circuits.</li> <li>Solder the built circuits.</li> <li>Apply safety precautions.</li> <li>Clean work area, tools and equipment.</li> <li>Store tools, equipment, and remaining materials.</li> </ul>		<ul> <li>building a series-parallel resistor.</li> <li>Theories: The trainee should explain:</li> <li>The application of series-parallel circuit.</li> <li>Electrical symbols used to construct the resistive circuit.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safe handling of work tools and equipment</li> <li>Electrical hazards</li> </ul>	<ul> <li>board</li> <li>Soldering iron/gun</li> <li>Electrician' knife</li> <li>Combination pliers</li> <li>Cutting pliers</li> <li>Multimeter</li> <li>Measuring tape</li> <li>Overalls</li> <li>Safety goggles</li> </ul>	
	3.2 Construction of capacitive circuit	(a) Building a single capacitor circuit.	• ICT-based Learning: Prepare a video clip showing building a single	Thestudentshould be able to:•Designacircuit diagramofthecapacitivecircuit.	Capacitive current conforms to the electrical block diagram.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to:	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be	60

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number	
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	Suggested of Resources Pe pe	of Periods per Unit
			<ul> <li>capacitor circuit.</li> <li>Field visit: Organise students in a group or whole class to visit a nearby Lab where a single- capacitor circuit is constructed.</li> <li>Group discussion: Guide students to present a report from the field visit.</li> </ul>	<ul> <li>Identify equipment, tools, and materials required.</li> <li>Prepare capacitors and cables for termination.</li> <li>Build a single capacitor circuit.</li> <li>Solder the built circuits.</li> <li>Measure and record the capacitive parameters of the circuits.</li> <li>Apply safety precautions.</li> <li>Clean work area, tools, and equipment.</li> </ul>		Buildasingle- capacitive circuit.Principles:The student shouldexplainshouldexplainthe principlesrelatedprinciples:relatedto buildingasingle capacitive circuit.for capacitive circuit.Theories:The student should explain:•Symbolsfor capacitor.•Propertiesof dielectric materialsCircumstantial knowledgeDetailed about:•Hazards Control Safe handling of work tools, and equipment.	<ul> <li>available</li> <li>Electronics board</li> <li>Electrician' knife</li> <li>Combination pliers</li> <li>Diagonal cutting pliers</li> <li>Multimeter</li> <li>Measuring tape</li> <li>Overalls</li> <li>Safety goggles</li> <li>Workbench</li> <li>Safety boots</li> </ul>		
		(b) Building series capacitor circuit.	• ICT-based Learning: Prepare a video clip showing series	Thestudentshould be able to:•Designacircuit diagramofthe	Capacitive current in the build series capacitor circuit conforms to the electrical block	Knowledge evidence: Detailed knowledge of: Method used: The student should explain	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and		

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			<ul> <li>capacitor circuit.</li> <li>Field visit: Organise students in a group or whole class to visit a nearby Lab where a series capacitor circuit is built.</li> <li>Group discussion: Guide students to present a report from the field visit.</li> </ul>	<ul> <li>capacitive circuit.</li> <li>Identify equipment, tools, and materials required.</li> <li>Prepare capacitors and cables for termination.</li> <li>Build a series capacitor circuit.</li> <li>Solder the built circuits.</li> <li>Measure and record the capacitive parameters of the circuits.</li> <li>Apply safety precautions.</li> <li>Clean work area, tools, and equipment.</li> </ul>	diagram.	how to: Build a series - capacitive circuit. <b>Principles:</b> The student should explain the principles related to building series capacitive circuit. <b>Theories:</b> The student should explain: • Behaviour of a series capacitive circuit. • Properties of dielectric materials. <b>Circumstantial</b> <b>knowledge</b> <b>Detailed knowledge</b> <b>about:</b> • Hazards Control Safe handling of work tools, and equipment.	<ul> <li>equipment are to be available</li> <li>Electronics board</li> <li>Electrician' knife</li> <li>Combination pliers</li> <li>Diagonal cutting pliers</li> <li>multimeter</li> <li>Measuring tape</li> <li>Overalls</li> <li>Safety goggles</li> <li>Workbench</li> <li>Safety boots</li> </ul>	
		(c) Building parallel capacitor circuit.	• ICT-based Learning: Prepare a video clip	Thestudentshould be able to:• Designa	Capacitive current in the built parallel capacitor circuit	Knowledge evidence: Detailed knowledge of: Method used: The	This unit can be achieved at the workplace or training institution.	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			<ul> <li>showing constructing parallel capacitor circuit.</li> <li>Field visit: Organise students in a group or whole class to visit a nearby lab where a parallel capacitor is constructed.</li> <li>Group discussion: Guide students to present a report from the field visit.</li> </ul>	<ul> <li>circuit diagram of the capacitive circuit.</li> <li>Identify equipment, tools, and materials required.</li> <li>Prepare capacitors and cables for termination.</li> <li>Build a parallel capacitor circuit.</li> <li>Solder the built circuits.</li> <li>Measure and record the capacitive parameters of the circuits.</li> <li>Apply safety precaution s.</li> <li>Clean work area, tools, and</li> </ul>	conforms to the electrical block diagram.	<ul> <li>student should explain how to:</li> <li>Build a parallel- capacitive circuit.</li> <li>Principles: The student should explain the principles related to building parallel capacitive circuit.</li> <li>Theories: The student should explain: <ul> <li>Behaviour of parallel capacitive circuit.</li> <li>Properties of dielectric materials.</li> <li>Circumstantial knowledge</li> </ul> </li> <li>Detailed knowledge about: <ul> <li>Hazards Control Safe handling of work tools, and equipment.</li> </ul> </li> </ul>	<ul> <li>The following tools, safety gear, and equipment are to be available</li> <li>Electronics board.</li> <li>Electrician's knife.</li> <li>Combination pliers</li> <li>Diagonal cutting pliers</li> <li>multimeter</li> <li>Measuring tape</li> <li>Overalls</li> <li>Safety goggles</li> <li>Workbench</li> <li>Safety boots</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
				equipment	a			
		(d) Building combination capacitor circuit.	<ul> <li>ICT-based Learning: Prepare a video clip showing a combination capacitor.</li> <li>Field visit: Organise students in a group or whole class to visit a nearby lab where a combination capacitor circuit is built.</li> <li>Group discussion: Guide students to present a report from the field visit.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Design a circuit diagram of the capacitive circuit.</li> <li>Identify equipment , tools, and materials required.</li> <li>Prepare capacitors and cables for terminatio n.</li> <li>Build a combined capacitor circuit.</li> <li>Solder the</li> </ul>	Capacitive current in the build combined capacitor circuit conforms to the electrical block diagram.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to:</li> <li>Build a combined capacitor capacitive circuit.</li> <li>Principles: The student should explain the principles related to building combined capacitor capacitive circuit.</li> <li>Theories: The student should explain:</li> <li>Properties of dielectric materials.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available</li> <li>Electronics board</li> <li>Electrician' knife</li> <li>Combination pliers</li> <li>Diagonal cutting pliers</li> <li>multimeter</li> <li>Measuring tape</li> <li>Overalls</li> <li>Safety goggles</li> <li>Workbench</li> <li>Safety boots</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Criter	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
	3.3 Construction of iinductive ccircuits	(a) Building a single iinductive ccircuit.	<ul> <li>Brainstorm: Guide the student to define inductor.</li> <li>Practical work: Guide the student to identify types of inductors.</li> <li>Activity: Set the students in groups to build a single inductor circuit.</li> </ul>	<ul> <li>built circuits.</li> <li>Measure and record the capacitive parameters of the circuits.</li> <li>Apply safety precautions.</li> <li>Clean work area, tools, and equipment.</li> <li>The student should be able to: <ul> <li>Design a circuit diagram of the inductive circuit.</li> <li>Identify equipment , tools and material required.</li> <li>Prepare inductors and cables</li> </ul> </li> </ul>	Inductive circuit constructed as per given standards.	<ul> <li>about:</li> <li>Hazards Control</li> <li>Safe handling of work tools, and equipment.</li> </ul> Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to build a single inductive circuit. Principles: The student should explain the principles related to building a single inductive circuit. Theories: The student should explain the principles related to building a single inductive circuit. Theories: The student should explain the principles related to building a single inductive circuit. Theories: The student should explain: <ul> <li>The application of a single inductive circuit.</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available • Electronics board • Electrician's knife • Combination pliers • Diagonal cutting pliers • Long nose pliers	60

Module Title	Unit Title		Suggested		Assessment Criter	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
				for terminatio n. Build a single inductor circuit. Solder the built circuits. Measure and record the inductive parameter s of the circuits. Observe safety precaution s. Clean work area, tools and equipment		<ul> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions on inductive load charges.</li> <li>Safe handling of working tools, equipment and an inductor.</li> </ul>	<ul> <li>Analogue and digital multimeter</li> <li>Measuring tape</li> <li>Overalls</li> <li>Safety goggles</li> <li>Workbench</li> <li>Safety boots</li> </ul>	
		(b) Building a series inductive circuit.	• Brainstorm: Guide students to define a	<ul> <li>The student should be able to:</li> <li>Design a</li> </ul>	Series inductive circuit constructed as	Knowledge evidence: Detailed knowledge of:	This unit can be achieved at the workplace or training institution.	

Module Title	Unit Title		Su	ggested			Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Tea Lea Me	aching and arning ethods		Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			•	series inductor. <b>Practical</b> work: Guide the student to identify properties of a series inductive circuit. <b>Activity:</b> Set the students in groups to build a series inductor circuit.	•	circuit diagram of the inductive circuit. Identify equipment, tools and materials required. Prepare inductors and cables for termination. Build a series inductor circuit. Solder the built circuits. Measure and record the inductive parameters of the circuits. Observe safety precautions. Clean work area, tools and equipment.	per given standards.	<ul> <li>Method used: The student should explain how to build a series inductive circuit.</li> <li>Principles: The student should explain the principles related to building a series inductive circuit.</li> <li>Theories: The student should explain:</li> <li>The application of a series inductive circuit.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions on inductive load charges.</li> <li>Safe handling of working tools, equipment and an inductor.</li> </ul>	The following tools, safety gear, and equipment are to be available Electronics board • Electrician's knife • Combination pliers • Diagonal cutting pliers • Long nose pliers • multimeter • Measuring tape • Overalls • Safety goggles • Workbench • Safety boots	
		(c) Building pparallel	•	<b>Brainstorm:</b> Guide the student to	•	The student should be able to:	Inductive circuit constructed as per given	Knowledge evidence:	This unit can be achieved at the workplace or	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
		iinductive ccircuit.	<ul> <li>define parallel inductive circuit.</li> <li>Practical work: Guide the student to state properties of parallel inductor circuit.</li> <li>Activity: Set the students in groups to build a parallel inductor circuit.</li> </ul>	<ul> <li>Design a circuit diagram of the inductive circuit.</li> <li>Identify equipment, tools and material required.</li> <li>Prepare inductors and cables for termination.</li> <li>Build a parallel inductor circuit.</li> <li>Solder the built circuits.</li> <li>Measure and record the inductive parameters of the circuits.</li> <li>Observe safety precautions.</li> <li>Clean work area, tools and equipment.</li> </ul>	standards.	<ul> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to build a parallel inductive circuit.</li> <li>Principles: The student should explain the principles related to building a single inductive circuit.</li> <li>Theories: The student should explain:</li> <li>The application of a parallel inductive circuit.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions on inductive load charges.</li> <li>Safety precautions when soldering the inductors.</li> </ul>	<ul> <li>training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Electronics board</li> <li>Electrician's knife</li> <li>Combination pliers</li> <li>Diagonal cutting pliers</li> <li>Long nose pliers</li> <li>multimeter</li> <li>Measuring tape</li> <li>Overalls</li> <li>Safety goggles</li> <li>Workbench</li> <li>Safety boots</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
		(d) Building a combineed inductive circuit.	<ul> <li>Brainstorm: Guide the student to define combined inductive circuit.</li> <li>Practical work: Guide the student to identify properties of a combineed inductive circuit.</li> <li>Activity: Set the students in groups to build a combined inductive circuit.</li> </ul>	<ul> <li>The student</li> <li>should be able to: <ul> <li>Design a</li> <li>circuit diagram</li> <li>of the</li> <li>inductive</li> <li>circuit.</li> </ul> </li> <li>Identify <ul> <li>equipment,</li> <li>tools and</li> <li>materials</li> <li>required.</li> </ul> </li> <li>Prepare <ul> <li>inductors and</li> <li>cables for</li> <li>termination.</li> </ul> </li> <li>Build a <ul> <li>combined</li> <li>inductive</li> <li>circuit.</li> </ul> </li> <li>Solder the <ul> <li>built circuits.</li> </ul> </li> <li>Measure and <ul> <li>record the</li> <li>inductive</li> <li>parameters of</li> <li>the circuits.</li> </ul> </li> <li>Observe safety <ul> <li>precautions.</li> <li>Clean work</li> <li>area, tools and</li> </ul> </li> </ul>	Combined Inductive circuit constructed as per given standards	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to build a combined inductive circuit.</li> <li>Principles: The student should explain the principles related to building a combined inductive circuit.</li> <li>Theories: The student should explain:</li> <li>The application of a single inductive circuit.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions on inductive load charges.</li> <li>Safe handling of working tools,</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available</li> <li>Electronics board</li> <li>Electrician's knife</li> <li>Combination pliers</li> <li>Diagonal cutting pliers</li> <li>Long nose pliers</li> <li>multimeter</li> <li>Measuring tape</li> <li>Overalls</li> <li>Safety goggles</li> <li>Workbench</li> <li>Safety boots</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	Training Requirements/	Number	
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
				equipment		equipment, and an inductor.		
		(e) Testing iinductive ccircuits.	<ul> <li>Brainstorm: Guide The student to define inductive circuit testing.</li> <li>Practical work: Guide the student to identify procedures for testing inductive circuit.</li> <li>Activity: Set the students in groups to perform testing in inductive circuit.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Design a circuit diagram of the inductive circuit.</li> <li>Identify equipment, tools and materials required.</li> <li>Prepare inductors and cables for termination.</li> <li>Build a single inductor circuit.</li> <li>Solder the built circuits.</li> <li>Measure and record the inductive parameters of the circuits.</li> <li>Observe safety precautions.</li> </ul>	Inductive circuit constructed tested and readings recorded as per given standards.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to test inductive circuit.</li> <li>Principles: The student should explain the principles related to testing the inductive circuit.</li> <li>Theories: The student should explain:</li> <li>How ammeter is connected to measure current in inductive circuit.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions when soldering the</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available</li> <li>Electronics board</li> <li>Electrician's knife</li> <li>Combination pliers</li> <li>Diagonal cutting pliers</li> <li>Long nose pliers</li> <li>multimeter</li> <li>Measuring tape</li> <li>Overalls</li> <li>Safety goggles</li> <li>Workbench</li> <li>Safety boots</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria Training		Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
	3.4 Constructing RLC circuit	(a)Building a resistance and capacitance circuit	<ul> <li>Brainstorm: Guide students to define the RC circuit</li> <li>Practical work: Guide the student to identify the behaviour of the RC circuit</li> <li>Activity Set the students in groups to Build a resistance and capacitance circuit</li> </ul>	<ul> <li>Clean work area, tools, and equipment.</li> <li>The student should be able to:</li> <li>Design a wiring diagram of the RC circuit.</li> <li>Identify equipment, tools, and materials required.</li> <li>Prepare resistor, capacitors, and cable for terminatio n.</li> <li>Measure and record the RC circuit the RC</li> </ul>	RC circuit built as per electrical specifications.	inductors. Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to build a resistance and capacitance circuit. Principles: The student should explain the principles related to building an RC circuit. Theories: The student should explain: • The RC circuit and its behaviour. • The uses of tools and equipment. Circumstantial knowledge	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Electrician board</li> <li>Electrician's knife</li> <li>Combination pliers</li> <li>Diagonal cutting pliers</li> <li>Long nose pliers</li> <li>multimeter</li> <li>Measuring tape</li> <li>Overalls</li> <li>Safety goggles</li> <li>Workbench</li> </ul>	75
				<ul> <li>parameter</li> <li>s of the circuit.</li> <li>Observe safety precaution s.</li> </ul>		Detailed knowledge about: • Safety precautions when soldering the RC circuit.	• Safety boots	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
				• Clean the work area, tools, and equipment		• Properties of materials Hazards classifications and controls		
		(b) Building a resistance and inductance circuit.	<ul> <li>Brainstorm: Guide the student to define the RL circuit.</li> <li>Practical work: Guide the student to identify the behaviour of the RL circuit.</li> <li>Activity: Set the students in groups to bbuild a resistance and inductance circuit.</li> </ul>	<ul> <li>The student</li> <li>besign a wiring diagram of the RL circuit.</li> <li>Identify equipment, tools, and materials required.</li> <li>Prepare resistor, capacitors, and cable for termination.</li> <li>Measure and record the RL parameters of the circuit.</li> <li>Observe safety precautions.</li> <li>Clean the work area, tools, and</li> </ul>	RL circuit built as per electrical specifications.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to build a resistance and inductance circuit.</li> <li>Principles: The student should explain the principles related to building a RL circuit.</li> <li>Theories: The student should explain:</li> <li>The RL circuit and its behaviour.</li> <li>The uses of tools and equipment. Circumstantial knowledge</li> <li>Detailed knowledge</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Electrician board</li> <li>Electrician's knife</li> <li>Combination pliers</li> <li>Diagonal cutting plier.</li> <li>Long nose pliers</li> <li>multimeter.</li> <li>Measuring tape</li> <li>Overalls</li> <li>Safety goggles</li> <li>Workbench</li> </ul>	

Module Title	Unit Title	El	Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
				equipment.		<ul> <li>about:</li> <li>Safety precautions when soldering the RC circuit.</li> <li>Properties of materials,</li> <li>hazards classifications, and controls</li> </ul>	Safety boots	
		(c) Building a resistance, capacitance and inductance circuit.	<ul> <li>Brainstorm: Guide the student to define the RLC circuit.</li> <li>Practical work: Guide the student to identify the behaviour of the RLC circuit.</li> <li>Activity: Set the students in groups to build a resistance, capacitance and inductance circuit.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Design a wiring diagram of the RLC circuit.</li> <li>Identify equipment, tools, and materials required.</li> <li>Prepare resistor, capacitors, and cable for termination.</li> <li>Measure and record the RCL parameters of</li> </ul>	RLC circuit built as per electrical specifications.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to build a resistance, capacitance and inductance circuit.</li> <li>Principles: The student should explain the principles related to resistance, capacitance and inductance circuit.</li> <li>Theories: The student should explain:</li> <li>The RLC circuit and its behaviour.</li> <li>The uses of tools and equipment.</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Electrician board</li> <li>Electrician's knife</li> <li>Combination pliers</li> <li>Diagonal cutting pliers</li> <li>Long nose pliers</li> <li>Analogue and digital multimeter</li> <li>Measuring tape</li> </ul>	

Module Title	Unit Title	Flomente	Suggested		Assessment Crite	Training Requirements/	Number	
(Main Competency )	(Specific Competencies)	(Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
				<ul> <li>the circuit.</li> <li>Observe safety precautions.</li> <li>Clean the work area, tools, and equipment.</li> </ul>		Circumstantial knowledge Detailed knowledge about: • Safety precautions when soldering the RC circuit. • Properties of materials, hazards classifications and controls	<ul> <li>Overalls</li> <li>Safety goggles</li> <li>Workbench</li> <li>Safety boots</li> </ul>	
	3.5 Measuring Electrical Quantities.	(a) Measuring voltage in the circuit.	<ul> <li>Brainst orm: Guide the students to explore ways of measuri ng voltage in a circuit.</li> <li>Think- ink- pair- share: Guide</li> </ul>	<ul> <li>The student should be able to:</li> <li>Determine component values.</li> <li>Connect simple electric circuits.</li> <li>Perform soldering.</li> <li>Measure electric voltage.</li> <li>Apply safety precautions.</li> <li>Clean workplace.</li> </ul>	A record of values of electrical voltage conforming to the specified ratings and Ohm's law.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to measure voltage in the circuit.</li> <li>Principles: The student should explain the principles related to measuring voltage in the circuit.</li> <li>Theories: The student should explain:</li> <li>The Ohm's law.</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available</li> <li>Electrical components</li> <li>multimeter.</li> <li>Tool kit</li> <li>Workbench light</li> <li>Power supply</li> <li>Safety boots</li> </ul>	50

Module Title	LL		Su	ggested	Assessment Criteria				Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods			Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
				the students to identify different types of instrume nts for measuri ng voltage in a circuit. • Group discussi on: Guide the students to present their results after measuri ng voltage in a circuit.		The student	A month of	<ul> <li>Different component ratings.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:         <ul> <li>Caution when performing measurement.</li> <li>Safe handling of measuring instruments.</li> </ul> </li> </ul>	<ul> <li>Plastic gloves</li> <li>Overalls</li> </ul>	
		(b) Measuring	•	Brainstorm:	-	The student	A record of	Knowledge evidence:	This unit can be	
		current in the		Guide the student to		should be able to:	electrical current		achieved at the	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
		circuit.	<ul> <li>explore ways of measuring current in a circuit.</li> <li>Think-ink- pair-share: Guide the students to identify different types of instruments for measuring current in a circuit.</li> <li>Group discussion: Guide the students to present their results after measuring current in a circuit.</li> </ul>	<ul> <li>Determine component values.</li> <li>Connect simple electric circuits.</li> <li>Measure electric current.</li> <li>Apply safety precautions.</li> <li>Clean workplace.</li> <li>Store tools and equipment.</li> </ul>	values conforming to the specified ratings and Ohm's law.	<ul> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to measure current in the circuit.</li> <li>Principles: The student should explain the principles related to measuring current in the circuit.</li> <li>Theories: The student should explain: <ul> <li>Ohm's law.</li> <li>Different component ratings.</li> <li>Circumstantial knowledge</li> </ul> </li> <li>Detailed knowledge about: <ul> <li>Caution when performing measurement.</li> <li>Safe handling of measuring instruments.</li> </ul> </li> </ul>	<ul> <li>workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Electrical components</li> <li>Analog and digital multimeter.</li> <li>Tool kit</li> <li>Workbench</li> <li>light</li> <li>Power supply</li> <li>Safety boots</li> <li>Plastic gloves</li> <li>Overall</li> </ul>	
Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
-----------------------	----------------------------	--	--	---	--	--	--	---------------------------
(Main Competency )	(Specific Competencies)	Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
		(c) Measuring resistance in the circuit.	<ul> <li>Brainstorm: Guide the students to explore ways of measuring resistance in a circuit.</li> <li>Think-ink- pair-share: Guide the students to identify different types of instruments for measuring resistance in a circuit.</li> <li>Group discussi on: Guide the students to present their results after measuring resistance in a circuit.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Determine component values.</li> <li>Connect simple electric circuits.</li> <li>Perform soldering.</li> <li>Measure electric resistance.</li> <li>Apply safety precautions.</li> <li>Clean workplace.</li> <li>Store tools and equipment.</li> </ul>	A record of values of electrical resistance conforming to the specified ratings and Ohm's law.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to measure resistance in the circuit.</li> <li>Principles: The student should explain the principles related to measuring resistance in the circuit:</li> <li>Theories: The student should explain: <ul> <li>Ohm's law.</li> <li>Different component ratings.</li> <li>Circumstantial knowledge</li> </ul> </li> <li>Detailed knowledge about: <ul> <li>Caution when performing measurement.</li> <li>Safe handling of measuring instruments.</li> </ul> </li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Electrical components • Multimeter • Tool kit • Workbench • Workbench light • Power supply • Safety boots • Plastic gloves • Overalls	

Module Title	Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency ) (Spec Comp	cific ( petencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
3.6 De charac active compo	Vetermining ( ccteristics of c e electronic connents.	(a) Testing characteristics of diodes.	<ul> <li>Brainstorm: Guide the student to define diode and their characteristic s.</li> <li>Practical work: Guide the student to follow procedures for testing diode.</li> <li>Activity: Set the students in groups to test characteristic s of diodes.</li> </ul>	Thestudentshould be able to:•Select tools, equipment, safety gear, and components.•Construct circuit.•Construct circuit.•Connect test equipment.•Perform component characteristics test.•Record test results.•Observe safety measures.•Clean workplace.•Store tools, equipment, safety gear, and components.	Test results of diode characteristics to conform to standard characteristics.	Knowledge evidence:Detailed knowledge of:The method used: Thestudent should explainhow to test thecharacteristics of thediode.Principles: The studentshould explain theprinciples: related totesting characteristics ofthe diode.Theories: The traineeshould explain: -• Semiconductordevices.• The PNjunction.• Properties ofsemiconductors.Circumstantialknowledge:Detailed knowledgeabout:• Semiconductors.	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available • Electronic components • Signal generator • Multimeter • Electronics technician's tool kit • Workbench light • Oscilloscope • Power supply • Safety boots • Helmets • Gloves • Safety goggles • Ooveralls	74

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
		(b) Testing characteristics of transistors.	<ul> <li>Brainstorm: Guide the student to define transistors.</li> <li>Practical work: Guide the student to follow procedures for testing transistors.</li> <li>Activity: Set the students in groups to test characteristic s of a transistor.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, safety gear, and components.</li> <li>Construct circuit.</li> <li>Connect test equipment.</li> <li>Perform component characteristics test.</li> <li>Record test results.</li> <li>Observe safety measures.</li> <li>Clean workplace</li> </ul>	Transistor test results conform to the standard characteristics.	characteristicsKnowledge evidence:Detailed knowledge of:The method used: Thestudent should explainhow to test thecharacteristics of thetransistor.Principles: The studentshould explain theprinciples: The studentshould explain theprinciples: The studentshould explain theprinciples related totesting characteristics ofa transistor.Theories: The traineeshould explain: -• Semiconductordevices.• The PNjunction.	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available should be available • Electronic components • Signal generator • Multimeters • Electronics technician's tool kit • Workbench • Workbench light • Oscilloscope	
				<ul> <li>Store tools, equipment, safety gear, and components.</li> </ul>		<ul> <li>Properties of semiconductors.</li> <li>Circumstantial knowledge:</li> <li>Detailed knowledge about:</li> <li>Semiconductors and</li> </ul>	<ul> <li>Power supply</li> <li>Safety boots</li> <li>Helmets</li> <li>Gloves</li> <li>Safety goggles</li> <li>Ooveralls</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
						their characteristic		
		(c) Testing characteristics of thyristor.	<ul> <li>Brainstorm: Guide the student to define thyristor.</li> <li>Practical work: Guide the student to follow procedures for testing thyristor.</li> <li>Activity: Set the students in groups to test the characteristic s of thyristor</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, safety gear, and components.</li> <li>Construct circuit.</li> <li>Connect test equipment.</li> <li>Perform component characteristics test.</li> <li>Record test results</li> <li>Observe safety measures</li> <li>Clean workplace</li> <li>Store tools, equipment, safety gear and components</li> </ul>	Thyristor Test results conform to standard characteristics.	Knowledge evidence: Detailed knowledge of: The method used: The student should explain how to test the characteristics of the thyristor. Principles: The student should explain the principles related to testing characteristics of Thyristor. Theories: The trainee should explain: - • Semiconductor devices • The PN junction • Properties of semiconductors Circumstantial knowledge: Detailed knowledge about: • Semiconductors	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available</li> <li>Electronic components</li> <li>Signal generator</li> <li>multimeters</li> <li>Electronics technician's tool kit</li> <li>Workbench light</li> <li>Oscilloscope</li> <li>Power supply</li> <li>Safety boots</li> <li>Helmets</li> <li>Gloves</li> <li>Safety goggles</li> <li>Ooveralls</li> </ul>	

Module Title	Unit Title		Suggested	Assessment Criteria			Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
						and their characteristics		
	3.7 Constructing rectifier circuits.	(a) Building half- wave rectifier.	<ul> <li>Brainstorm: Guide the student to explore ways of building a half wave rectifier with (centre- tapped).</li> <li>Think-ink- pair-share: Guide the students on the characteristic s of half wave rectifier (centre tapped).</li> <li>Group discussion</li> <li>Guide the students to present their results after building a half wave rectifier (centre- tapped)</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, components, and safety gear.</li> <li>Construct a wave rectifier circuit.</li> <li>Supply power to the circuit.</li> <li>Test constructed circuit.</li> <li>Record test results.</li> <li>Observe safety.</li> <li>Clean workplace.</li> <li>Store tools, equipment, components, and safety gear.</li> <li>Dispose of waste.</li> </ul>	Constructed half wave rectifier circuit functions as per specifications.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to build a half- wave rectifier. Principles: The student should explain principles related to building half wave rectifier. Theories: The student should explain: - • Diode as a rectifier. • Switched power supplies. • Properties of semiconductors. Circumstantial knowledge: Detailed knowledge about: • Soldering • Circuit testing	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available -</li> <li>Electronic components</li> <li>Signal generator</li> <li>multimeter</li> <li>Electronics technician's tool kit</li> <li>Workbench</li> <li>Workbench light</li> <li>Oscilloscope</li> <li>Power supply</li> <li>Safety boots</li> <li>Helmets</li> <li>Gloves</li> <li>Safety goggles</li> <li>Overalls</li> </ul>	74

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
			tapped).					
		(b) Building full- wave rectifier (centre tapped).	<ul> <li>Brainstorm: Guide the student to explore ways of building a full wave rectifier with (centre tapped).</li> <li>Think-ink- pair-share: Guide the students on the characteristic s of full wave rectifier (centre tapped).</li> <li>Group discussion</li> <li>Guide the students to present their results after building a full wave rectifier (centre- tapped)</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, components, and safety gear.</li> <li>Construct a full wave rectifier circuit.</li> <li>Supply power to the circuit.</li> <li>Test constructed circuit.</li> <li>Record test results.</li> <li>Observe safety.</li> <li>Clean workplace.</li> <li>Store tools, equipment, components, and safety gear.</li> <li>Dispose of</li> </ul>	Constructed full wave rectifier circuit functions as per specifications.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to build a full wave rectifier.</li> <li>Principles: The student should explain principles related to building full wave rectifier.</li> <li>Theories: The student should explain: -</li> <li>Diode as a rectifier.</li> <li>Switched power supplies.</li> <li>Properties of semiconductors.</li> <li>Circumstantial knowledge:</li> <li>Detailed knowledge about:</li> <li>Soldering</li> <li>Circuit testing</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available should be available</li> <li>Electronic components</li> <li>Signal generator</li> <li>Analog and digital mustimeters</li> <li>Electronics technician's tool kit</li> <li>Workbench</li> <li>Workbench light</li> <li>Oscilloscope</li> <li>Power supply</li> <li>Safety boots</li> <li>Helmets</li> <li>Gloves</li> <li>Safety goggles</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
		(c) Building bridge rrectifier	<ul> <li>tapped).</li> <li>Brainstorm: Guide the students to explore ways of building a bridge rectifier.</li> <li>Think-ink- main charact</li> </ul>	<ul> <li>waste.</li> <li>The student should be able to:</li> <li>Select tools, equipment, components, and safety gear.</li> <li>Construct</li> </ul>	Constructed bridge rectifier circuit functions as per specifications.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to build a bridge rectifier. Principles: The student	• Overalls This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available	
			<ul> <li>pair-share: Guide the students to identify ways of building a bridge rectifier.</li> <li>Group discussion</li> <li>Guide the students to present their results after building a bridge rectifier.</li> </ul>	<ul> <li>Construct bridge rectifier circuit.</li> <li>Supply power to the circuit.</li> <li>Test constructed circuit.</li> <li>Record test results.</li> <li>Observe safety.</li> <li>Clean workplace.</li> <li>Store tools, equipment, components, and safety gear.</li> <li>Dispose of</li> </ul>		<ul> <li>Frinciples: The student should explain principles related to building bridge rectifiers.</li> <li>Theories: The student should explain: -</li> <li>Diode as a rectifier.</li> <li>Switched power supplies.</li> <li>Properties of semiconductors.</li> <li>Circumstantial knowledge:</li> <li>Detailed knowledge about:</li> <li>Soldering</li> </ul>	<ul> <li>Electronic components</li> <li>Signal generator</li> <li>Multimeter</li> <li>Electronics technician's tool kit</li> <li>Workbench</li> <li>Workbench light</li> <li>Oscilloscope</li> <li>Power supply</li> <li>Safety boots</li> <li>Helmets</li> <li>Gloves</li> <li>Safety goggles</li> <li>Overalls</li> </ul>	

Module Title	Unit Title		Suggested		Assessment Crite	Training Requirements/	Number	
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
		(d) Building a smoothing circuit	<ul> <li>Brainstorm: Guide the students to explore ways of building a smoothing circuit.</li> <li>Think-ink- pair-share: Guide the students to identify ways of building a smoothing circuit.</li> <li>Group discussion</li> <li>Guide the students to present their results about</li> </ul>	<ul> <li>waste.</li> <li>The student should be able to:</li> <li>Select tools, equipment, components, and safety gear.</li> <li>Construct a smoothing circuit.</li> <li>Supply power to the circuit.</li> <li>Test constructed circuit.</li> <li>Record test results.</li> <li>Observe safety.</li> <li>Clean workplace.</li> </ul>	Constructed smoothing circuit functions as per specifications.	<ul> <li>Circuit testing</li> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to build a smoothing circuit.</li> <li>Principles: The student should explain principles related to building a smoothing circuit.</li> <li>Theories: The student should explain: -</li> <li>The application of filter capacitor.</li> <li>Switched power supplies.</li> <li>Properties of semiconductors</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available - • Electronic components • Signal generator • Multimeters • Electronics technician's tool kit • Workbench • Workbench light • Oscilloscope • Power supply • Safety boots	
			building a smoothing current.	<ul> <li>Store tools, equipment, components, and safety gear.</li> <li>Dispose waste.</li> </ul>		Circumstantial knowledge: Detailed knowledge about: • Soldering	<ul><li>Helmets</li><li>Gloves</li><li>Safety goggles</li><li>Overalls</li></ul>	

Module Title	Unit Title		Suggested		Assessment Crite	ria	Training Requirements/	Number
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit
						Circuit testing		
		(e) Testing rrectifier ccircuits	<ul> <li>Brainstorm: Guide the students to explore ways of measuring voltage in a circuit.</li> <li>Think-ink- pair-share: Guide the students to identify different types of instruments for measuring voltage in a circuit.</li> <li>Group discussion Guide the students to present their results after measuring voltage in a circuit.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, components and safety gear.</li> <li>Construct rectifier circuit.</li> <li>Supply power to the circuit.</li> <li>Test constructed rectifier circuit.</li> <li>Record test results.</li> <li>Observe safety precautions.</li> <li>Clean the workplace.</li> <li>Store tools, equipment, components, and safety gear.</li> <li>Dispose of waste.</li> </ul>	Constructed rectifier circuit tested as per specifications.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to test rectifier circuits.</li> <li>Principles: The student should explain principles related to testing rectifier circuit.</li> <li>Theories: The student should explain: -</li> <li>The importance of testing rectifier circuit.</li> <li>Switched power supplies.</li> <li>Properties of semiconductors.</li> <li>Circumstantial knowledge:</li> <li>Detailed knowledge about:</li> <li>Soldering</li> <li>Circuit testing</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available -</li> <li>Electronic components</li> <li>Signal generator</li> <li>Multimeters</li> <li>Electronics technician's tool kit</li> <li>Workbench light</li> <li>Oscilloscope</li> <li>Power supply</li> <li>Safety boots</li> <li>Helmets</li> <li>Gloves</li> <li>Safety goggles</li> <li>Overalls</li> </ul>	

Module Title Unit Title	Flowerto	Suggested		Assessment Crite	Training Requirements/	Number		
(Main Competency )	(Specific Competencies)	Elements (Learning Activities)	Teaching and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Suggested Resources	of Periods per Unit

## FORM TWO

## Table 3: Detailed contents for Form Two

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	ŗ	Suggested Feaching and Learning			Assessment Crite	ria	Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)			Methods	Process Assessment		Product/Service Assessment	Knowledge Assessment		
1.0. Performing preventive maintenance of tools, equipment, and machines.	1.1 Performing preventive maintenance of electrical tools.	(a) Maintaining wworkshop ssafety gear.	•	Questionand answerAsk questionsand guidestudents toanswerquestions ondefiningworkshopsafety gearICT-basedLearning:Prepare avideo clipshowing allthe stepsrelated tommaintainingworkshopsafter gear.Demonstrateto student allprocedures onhow tommaintain	The should to: • Se • Int ma scl ch • Ide fau • Ob saf pre • Clo eq ma ano wc • Sto ano eq	student be able lect tools. erpret intenance hedule art. entify dts. serve ety ecautions. ean tools, hipment, ichines, d rkplace. ore tools d uipment.	Workshop safety gears are Maintained as per the manufacturer's specifications.	Knowledge evidence:Detailed Knowledgeof:Method used:The student shouldexplain how tomaintain workshopsafety gear.Principles: The studentshould explain theprinciples related tomaintaining safetygear.Theories: The studentshould explain how tomaintaining safetygear.CircumstantialknowledgeDetailed knowledgeabout:Safety precautions to	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available -</li> <li>Assorted power- operated hand tools</li> <li>Assorted automatic tool kits</li> <li>Maintenance schedule chart</li> <li>Waste bin</li> <li>Blower</li> <li>Spirit can</li> <li>Safety clear glasses</li> <li>Gloves</li> <li>Overcoat</li> </ul>	46

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	Training Requirements/ Suggested Resources	Number of Periods per Unit	
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			<ul> <li>wworkshop ssafety gear.</li> <li>Activity :Set the students in manageable small groups and guide them to discuss ways of mmaintaining wworkshop ssafety gear.</li> </ul>			be observed while maintaining equipment/machines, safe handling of tools and equipment.		
		(b) Maintaining electrical hand tools.	<ul> <li>Questions and answers Ask questions and guide students to answer questions on defining hand tools.</li> <li>ICT-based Learning: Prepare a video clip showing all the steps related to</li> </ul>	<ul> <li>The student</li> <li>should be able</li> <li>to:</li> <li>Select tools.</li> <li>Interpret maintenance schedule chart.</li> <li>Identify faults.</li> <li>Observe safety precautions.</li> <li>Clean tools, equipment, machines,</li> </ul>	Electrical hand tools are maintained as per the manufacturer's specifications.	Knowledge evidence:Detailed Knowledgeof:Method used:The student shouldexplain different waysof maintaining tools.Principles:The student should explainthe principles related tomaintaining safetygear.Theories:The student should explain how to	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available ing: -</li> <li>Assorted power- operated hand tools</li> <li>Assorted automatic tool kits</li> <li>Maintenance schedule chart</li> <li>Waste bin</li> <li>Blower</li> <li>Spirit can</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	ria	Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)	,	Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			<ul> <li>mmaintaining electrical hand tools.</li> <li><b>Demonstrati</b> on: Demonstrate to student all procedures on how to mmaintain electrical hand tools.</li> <li><b>Activity:</b> Set the students in manageable small groups and guide them to discuss ways of mmaintaining electrical hand tools.</li> </ul>	and workplace. • Store tools and equipment.		maintain workshop safety gear. Circumstantial knowledge Detailed knowledge about: Safety precautions to be observed while maintaining equipment/machines. Safe handling of tools and equipment.	<ul> <li>Safety clear glasses</li> <li>Gloves</li> <li>Over coat</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	ria	Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
		(c) Maintaining measuring tools.	<ul> <li>Brainstorm: Guide the student to identify, measuring tools.</li> <li>Practical work: Guide the student on how to maintain measuring tools.</li> <li>Group discussion: Guide the student to discuss ways of maintaining measuring tools.</li> </ul>	<ul> <li>The student</li> <li>should be able</li> <li>to:</li> <li>Select tools.</li> <li>Interpret maintenance schedule chart.</li> <li>Identify faults.</li> <li>Observe safety precautions.</li> <li>Clean tools, equipment, machines, and workplace.</li> </ul>	Electrical measuring tools are Maintained as per the manufacturer's specifications.	Knowledge evidence:Detailed Knowledgeof:Method used:The student shouldexplain different waysof maintaining tools.Principles:Thestudent should explainthe principles related tomaintaining measuringtools.Theories:The student should explain how tomaintainworkshopsafety gear.Circumstantialknowledgeknowledgeabout:Safety precautions tobe observed whilemaintainingequipment/machines.Safe handling of tools	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available.</li> <li>Assorted power- operated hand tools</li> <li>Assorted automatic tool kits</li> <li>Maintenance schedule chart</li> <li>Waste bin</li> <li>Blower</li> <li>Spirit can</li> <li>Safety clear glasses</li> <li>Gloves</li> <li>Overcoat</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	eria	Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)	Activities)	Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment and equipment		
	1.2 Performing preventive maintenance of electrical equipment.	(a) Maintaining passive equipment.	<ul> <li>Brainstorm: Guide the student to define passive equipment.</li> <li>ICT-based Learning:</li> <li>Prepare relevant videos showing basic principles of maintaining passive equipment.</li> <li>Group discussion: Guide the student to discuss procedures for</li> </ul>	Thestudentshouldbeableto:•Selecttools, equipment, and safety gear.•Categorise equipment.•Categorise equipment.•Identify equipment faults.•Rectify faulty equipment.•Observe safety precautions.•Clean tools and equipment•Store tools and equipment.	Passive equipment is maintained as per the manufacturer's specifications.	Knowledge evidence:DetailedKnowledgeof:Method used:Method used:The student shouldexplain different waysof maintaining passiveequipment.Principles:Thestudent should explainthe principles related tomaintainingpassiveequipment.Theories:The studentshould explain how tomaintainpassiveequipment.Circumstantial	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available • Store room • Tool racks • Cabinets • Tool boxes • Tool shelves • Workbench • Service manuals • Store ledgers • Assorted equipment • Vice • Spirit can • Over-coat • Gloves • Safety clear glasses	32

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	eria	Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			maintaining passive equipment.			<ul> <li>knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions to be observed while maintaining equipment/machi nes</li> <li>Safe handling of tools and equipment</li> </ul>		
		(b) Maintaining active equipment.	<ul> <li>Questions and answers Through question and answers guide students to define active equipment.</li> <li>Demonstrate -on: Demonstrate the student procedures for maintaining</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and safety gear.</li> <li>Categories equipment.</li> <li>Identify equipment faults.</li> <li>Rectify faulty equipment.</li> <li>Observe</li> </ul>	Active equipment is Maintained as per the manufacturer's specifications.	Knowledge evidence:DetailedKnowledgeof:Method used:The student shouldexplain different waysofmaintainingequipment.Principles: The studentshouldexplaintheprinciples related tomaintainingpassive	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available • Store room • Tool racks • Cabinets • Toolboxes • Tool shelves • Workbench • Service manuals • Store ledgers • Assorted Equipment • Vice	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	ProcessProduct/ServiceKnowledgeAssessmentAssessmentAssessment		Knowledge Assessment		
			active equipment. • Activity: Guide the student to discuss ways of maintaining active equipment.	safety precautions. • Clean tools and equipment. • Store tools and equipment.		equipment. Theories: The student should explain: Safety precautions of equipment. Circumstantial knowledge Detailed knowledge about: • Safety precautions to be observed while maintaining tools.	<ul> <li>Spirit can</li> <li>Over-coat</li> <li>Gloves</li> <li>Safety clear glasses</li> <li>Projector</li> </ul>	
	1.3 Performing preventive maintenance of the simple	(a) Maintaining power machines.	<ul> <li>Brainstorm: Guide the student to define power machines.</li> <li>Practical work: Guide</li> </ul>	The student should be able to: • Interpret machine manual. • Prepare	Power machines are maintained to conform to the manufacturer's specifications.	Knowledge evidence: Detailed knowledge of: Method used:	This Unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be	22

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	Training Requirements/ Suggested Resources	Number of Periods per Unit	
	es)	,	Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
	electric machine.		<ul> <li>the student to identify different types of power machines.</li> <li>Activity: Set the students in groups to perform maintenance on power machines.</li> </ul>	<ul> <li>maintenance schedule.</li> <li>Detect machine faults.</li> <li>Perform oiling.</li> <li>Grease machine.</li> <li>Sharpen cutting tools.</li> <li>Perform greasing.</li> <li>Clean work place.</li> <li>Dusting off machines</li> </ul>		The student should explain different ways of maintaining machine/equipment. <b>Principles:</b> The student should explain the principle that is related to maintaining power machines. <b>Theories:</b> The student should explain: • Parts of machines and their maintenance. • Types of maintenance in each machine part. • The role of lubricants in machines. <b>Circumstantial</b> <b>knowledge</b> <b>Detailed knowledge</b> <b>about:</b> • Safety aspect related to machine maintenance and eenvironmental issues	<ul> <li>available: -</li> <li>Powered machine</li> <li>Mechanical machine</li> <li>Air compressor</li> <li>Lubricating equipment</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning Matheda	Assessment Criteria	Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	ProcessProduct/ServiceKnowledgeAssessmentAssessmentAssessment		
		(b) Maintaining manual machines.	<ul> <li>Questions and answers Through questions and answers guide students to define manual machine.</li> <li>Demonstrate -on: Demonstrate the student procedures for maintaining manual machine.</li> <li>Activity: Guide the student to discuss ways of maintaining manual machines.</li> </ul>	<ul> <li>The student should be are maintained to conform to the manufacturer's machine specifications.</li> <li>Prepare maintenance schedule.</li> <li>Detect machine faults.</li> <li>Perform oiling.</li> <li>Grease machine.</li> <li>Sharpen cutting tools.</li> <li>Perform greasing.</li> <li>Clean work place.</li> <li>Dusting off machines.</li> <li>Manual machines are maintained to conform to the manufacturer's specifications.</li> <li>Method used:</li> <li>The student shou explain different of maintaining manufactures.</li> <li>Principles: The standard explain th principle related to maintaining manufactures.</li> <li>Theories: The standard explain.</li> <li>Perform greasing.</li> <li>Clean work place.</li> <li>Dusting off machines.</li> </ul>	nce:This Unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be availablegePowered machine • Available'ays • Powered machine • Air compressor • Lubricating equipmentudentLubricating • equipmentdentImage: Since and second secon	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crit	eria	Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
2.0 Derforming		(a) Making		The student	The joint mode is	<ul> <li>about:</li> <li>Safety aspect related to machine maintenance and eenvironmental issues</li> </ul>	This unit can be achieved.	
2.0 Performing basic electrical installation.	2.1 Performing cold electrical joint.	(a) Making eyelet joint.	<ul> <li>Question s and answers Ask questions and guide students to answer questions on defining eyelet joint.</li> <li>ICT-based Learning: Prepare a video clip showing all the steps related to making eyelet</li> </ul>	The student should be able to: • Identify tools, equipment, and materials required. • Prepare cables for termination. • Make cable joints. • Test joints. • Apply safety precautions. • Clean work area. • Store tools, equipment, and remaining materials.	The joint made is mechanically and electrically sound.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Eyelet joint.</li> <li>Method used: The student should explain how to:</li> <li>Prepare cables for jointing.</li> <li>Execute particular joints.</li> <li>Principles: The student should explain the principles of making eyelet joints.</li> <li>Theories: The student should explain:</li> <li>Properties of conductor materials.</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Combination pliers</li> <li>Electrician knife</li> <li>Measuring tape</li> <li>Long nose pliers</li> <li>Multimeter</li> <li>Safety goggles</li> <li>Safety boots</li> <li>Overalls</li> <li>Workbench</li> </ul>	91

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)		Suggested Teaching and Learning		Assessment Criteria			Number of Periods per Unit
	es)			Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			•	joint. Demonstrate -on: Demonstrate to student all procedures on how to make eyelet joint. Activity: Set the students in manageable small groups and guide them to discuss ways of mmaintaining making eyelet joint			<ul> <li>Factors determining strength of various joints.</li> <li>Advantages of joints.</li> <li>How to select the correct type of joint for a particular application? Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety measures involved in making joints.</li> </ul>		
		(b) Making crimp joint.	•	Questions and answers: Through questions and answer guide students to define crimp joints. Interment and library: Guide the	The student should be able to: • Identify tools, equipment, and materials required. • Prepare cables for termination.	The crimp joint made is mechanically and electrically sound.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Making Crimp joint</li> <li>Method used: The student should explain how to:</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Combination pliers</li> <li>Electrician knife</li> <li>Measuring tape</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Criteria			Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			<ul> <li>student to search relevant information on application of crimp joint.</li> <li>Activity: Set the students in groups to make crimp joints.</li> </ul>	<ul> <li>Make cable joints.</li> <li>Test joints.</li> <li>Apply safety precautions.</li> <li>Clean work area.</li> <li>Store tools, equipment, and remaining materials.</li> </ul>		<ul> <li>Prepare cables for jointing.</li> <li>Execute particular joints</li> <li>Principles: The student should explain the principles of making crimp joints</li> <li>Theories: The student should explain:</li> <li>Properties of conductor materials</li> <li>Factors determining strength of various joints</li> <li>Advantages of joints</li> <li>How to select the correct type of joint for a particular application? Circumstantial knowledge</li> <li>Detailed knowledge about</li> <li>Safety measures</li> </ul>	<ul> <li>Long nose pliers</li> <li>Multimeter</li> <li>Safety goggles</li> <li>Safety boots</li> <li>Overalls</li> <li>Workbench</li> </ul>	

Module TitleUnit Title(Main Competency )(Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning Motheda	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
es)		Methous	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			The student	The neurlisi	involved in making joints.		
	(c) Making Parallel Clamp Joint	<ul> <li>Group discussion: Guide the students to discuss and present their work from the literature on how to make parallel joint.</li> <li>Internet and Library: Guide the student to search for relevant information on how to make parallel joint</li> <li>Field practical: Guide students in groups or individual to visit TANESCO</li> </ul>	<ul> <li>The student should be able to:</li> <li>Identify tools, equipment, and materials required.</li> <li>Prepare cables for termination.</li> <li>Make cable joints.</li> <li>Test joints.</li> <li>Apply safety precautions.</li> <li>Clean work area.</li> <li>Store tools, equipment, and remaining materials.</li> </ul>	The parallel clamp joint made is mechanically and electrically sound.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Types of parallel clamp joint.</li> <li>Method used: The student should explain how to:</li> <li>Prepare cables for jointing.</li> <li>Execute particular joints.</li> <li>Principles: The student should explain the principles of making parallel clamp joint.:</li> <li>Theories: The student should explain:</li> <li>Properties of conductor materials.</li> <li>Factors determining strength of various joints.</li> <li>Advantages of</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Combination pliers</li> <li>Electrician knife</li> <li>Measuring tape</li> <li>Long nose pliers</li> <li>Multimeter</li> <li>Safety goggles</li> <li>Safety boots</li> <li>Overalls</li> <li>Workbench</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Criteria		Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			power supply lines to identify typical application of Parallel joint			<ul> <li>joints.</li> <li>How to select the correct type of joint for a particular application?</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about</li> <li>Safety measures involved in making joints.</li> </ul>		
		(d) Making bolt joint.	<ul> <li>Group discussion: Guide students to discuss and present their work from the literature on procedures of making a bolt joint.</li> <li>Internet and Library: Guide the student to search for relevant</li> </ul>	<ul> <li>The student should be able to:</li> <li>Identify tools, equipment, and materials required.</li> <li>Prepare cables for termination.</li> <li>Make cable joints.</li> <li>Test joints.</li> <li>Apply safety precautions.</li> <li>Clean work</li> </ul>	The bolt joint made is mechanically and electrically sound.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Types of bolt joints Method used: The student should explain how to:</li> <li>Prepare cables for jointing.</li> <li>Execute particular joints.</li> <li>Principles: The student should explain the principles of making a</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Combination pliers.</li> <li>Electrician knife.</li> <li>Measuring tape.</li> <li>Long nose pliers.</li> <li>Multimeter.</li> <li>Safety goggles.</li> <li>Safety boots.</li> <li>Overall.</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			<ul> <li>information on the importance of making a parallel joint.</li> <li>Field practical: Guide students in groups or an individual to visit TANESCO sub station to identify pparallel joints.</li> </ul>	area. • Store tools, equipment, and remaining materials.		<ul> <li>bolt joint.</li> <li>Theories: The student should explain: <ul> <li>Properties of conductor materials.</li> <li>Factors determining strength of various joints.</li> <li>Advantages of a bolt joint.</li> <li>How to select the correct type of joint for a particular application?</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about</li> <li>Safety measures involved in making joints.</li> </ul> </li> </ul>	• Workbench	
		(e) Making twist joint.	• <b>Brainstorm:</b> Guide the student to define a twist joint.	The student should be able to: • Identify tools,	The twist joint made is mechanically and electrically	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Types of twist</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Suggested Assessment Criteria Teaching and Learning		Training Requirements/ Suggested Resources	Number of Periods per Unit	
	es)	,	Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			<ul> <li>Practical work: Guide the student on the procedure for making twist joints.</li> <li>Activity: Set the students in groups to make twist joints.</li> </ul>	<ul> <li>equipment, and materials required.</li> <li>Prepare cables for termination.</li> <li>Make cable joints.</li> <li>Test joints.</li> <li>Apply safety precautions</li> <li>Clean work area.</li> <li>Store tools, equipment, and remaining materials.</li> </ul>	sound.	joints Method used: The student should explain how to make twist joints. Principles: The student should explain the principles of making twist joints. Theories: The student should explain: Properties of conductor materials. Factors determining strength of various joints. Advantages of twist joints. Circumstantial knowledge Detailed knowledge about: Safety measures involved in making joints.	to be available: Combination plier. Electrician knife Measuring tape Long nose pliers Multimeter Safety goggles Safety boots Overalls Workbench	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Criteria			Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
		(f) Making a tee joint.	<ul> <li>Group discussion: Guide students to discuss and present their work from the literature on procedures for making a tee joint.</li> <li>Internet and Library: Guide the student to search for relevant information on the importance of making a tee joint.</li> <li>Field practical: Guide students in groups or an individual to visit TANESCO service line to identify tee joint.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Identify tools, equipment, and materials required.</li> <li>Prepare cables for termination.</li> <li>Make cable joints.</li> <li>Test joints.</li> <li>Apply safety precautions.</li> <li>Clean work area.</li> <li>Store tools, equipment, and remaining materials.</li> </ul>	Tee joint made is mechanically and electrically sound.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Types of Tee joints.</li> <li>Method used: The student should explain how to make a tee joint.</li> <li>Principles: The student should explain the principles of making tee joints:</li> <li>Theories: The student should explain:</li> <li>Properties of conductor materials.</li> <li>Factors determining strength of various joints.</li> <li>Advantages of tee joints.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment should be available:</li> <li>Combination pliers</li> <li>Electrician knife</li> <li>Measuring tape</li> <li>Long nose pliers</li> <li>Multimeter</li> <li>Safety goggles</li> <li>Safety boots</li> <li>Overalls</li> <li>Workbench</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Suggested Assessment Criteria Teaching and Learning		Training Requirements/ Suggested Resources	Number of Periods per Unit	
	es)	,	Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
					Martin	<ul> <li>Safety measures involved in making joints.</li> </ul>		
		(g) Making Married Joint	<ul> <li>Brainstorm: Guide the student to define married joints</li> <li>Practical work: Guide the student on the procedure for making married joints.</li> <li>Activity: Set the students in groups to make married joints.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Identify tools, equipment, and materials required.</li> <li>Prepare cables for termination.</li> <li>Make cable joints.</li> <li>Test joints.</li> <li>Apply safety precautions.</li> <li>Clean work area.</li> <li>Store tools, equipment, and remaining materials.</li> </ul>	Married joint is mechanically and electrically sound.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of making married joints.</li> <li>Method used: The student should explain how to make married joints.</li> <li>Principles: The student should explain the principles of making married joints.</li> <li>Theories: The student should explain: <ul> <li>Properties of conductor materials.</li> <li>Factors determining strength of various joints.</li> </ul> </li> <li>Advantages of</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Combination pliers</li> <li>Electrician knife</li> <li>Measuring tape</li> <li>Long nose pliers</li> <li>Multimeter</li> <li>Safety goggles</li> <li>Safety boots</li> <li>Overalls</li> <li>Workbench</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Criteria			Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
						<ul> <li>married joints.</li> <li>How to select the correct type of joint for a particular application?</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about</li> <li>Safety measures involved in making joints.</li> </ul>		
	2.2 Performing soft soldering.	(a) Carrying out soft soldering.	<ul> <li>Questions and answers Guide the student to ask and answer questions on defining soft soldering.</li> <li>Demonstrate -on: Demonstrate to the students the procedure for making soft soldering.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Identify tools, safety gears, equipment, and materials required.</li> <li>Prepare the parts to be soldered.</li> <li>Heat the surface thoroughly.</li> <li>Solder the</li> </ul>	The joint soldered is mechanically and electrically sound.	Knowledge evidence:Detailedknowledgeof:Methodused:The student should explainhow to carry out softsoldering.Principles:The studentshould explainthe principles of carryingout soft soldering.Theories:The student	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>made available:</li> <li>Soldering iron</li> <li>Diagonal cutting pliers</li> <li>Combination pliers</li> <li>Blow lamp</li> <li>Soldering stand</li> <li>Adjustable third</li> </ul>	53

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning Mathedre	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Wiethous	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			• Internet and Library: Guide the student to search for relevant information on the range of temperature applied while making soft soldering.	<ul> <li>parts.</li> <li>Remove surplus solder using a wire brush.</li> <li>Safety precautions.</li> <li>Clean the work area.</li> </ul>		<ul> <li>should explain:</li> <li>Types of soldering materials.</li> <li>Application of soft soldering.</li> <li>The uses of various tools and equipment.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safe handling of working tools and materials.</li> </ul>	hand with magnifying glass Soldering sucker Pot and ladle Electrician knife Long nose pliers Safety goggles Safety boots Overalls Safety gloves	
		(b) Carrying out hard soldering.	<ul> <li>Questions and answers Guide the student to ask and answer questions on defining hard soldering.</li> <li>Demonstrati- on: Demonstrate to the student</li> </ul>	<ul> <li>The student should be able to:</li> <li>Identify tools, safety gears, equipment, and materials required.</li> <li>Prepare the parts to be soldered.</li> </ul>	The joint soldered is mechanically and electrically sound.	Knowledge evidence:Detailedknowledgeof:Methodused:Thestudentshouldexplainhow to carry out softsoldering.Principles:The studentshouldexplaintheprinciples ofcarrying	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: Soldering iron Diagonal cutting pliers Combination pliers	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			<ul> <li>the procedure for making hard soldering.</li> <li>Internet and Library: Guide the student to search for relevant information on range of temperature applied while making hard soldering.</li> </ul>	<ul> <li>Heat the surface thoroughly.</li> <li>Solder the parts.</li> <li>Remove surplus solder using a wire brush.</li> <li>Safety precautions.</li> <li>Clean the work area.</li> </ul>		<ul> <li>out soft soldering.</li> <li>Theories: The student should explain:</li> <li>Types of soldering materials.</li> <li>Application of soft soldering.</li> <li>The uses of various tools and equipment.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safe handling of working tools and materials</li> </ul>	<ul> <li>Blow lamp</li> <li>Soldering stand</li> <li>Adjustable third hand with magnifying glass.</li> <li>Soldering sucke.</li> <li>Pot and ladle</li> <li>Electrician knife</li> <li>Long nose pliers</li> <li>Safety goggles</li> <li>Safety boots</li> <li>Overalls</li> <li>Safety gloves</li> </ul>	
	2.3 Installing Lighting Circuits	(a) Installing lighting points controlled by one way one gang switch.	<ul> <li>Question s and answers</li> <li>Ask questions and guide students to answer questions on defining one- way switch.</li> <li>ICT-</li> </ul>	<ul> <li>The student should be able to:</li> <li>Prepare electrical drawings.</li> <li>Identify tools, equipment, and</li> </ul>	Lighting circuits controlled by a one-way switch one-gang installed as per standards.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to install lighting points controlled by	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Combination pliers</li> </ul>	115

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Criteria			Number of Periods per Unit
	es)	,	Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			<ul> <li>based Learning: Prepare a video clip showing all the steps related to installing lighting points controlled by one way one gang switch.</li> <li>Demonstrate to student all procedures on how to Install lighting points controlled by one way one gang switch.</li> <li>Activity: Set the students in manageable small groups and guide them to Install lighting points controlled by one- way- one gang switch.</li> </ul>	<ul> <li>materials</li> <li>required.</li> <li>Prepare</li> <li>accessories and</li> <li>cables for lighting</li> <li>circuits.</li> <li>Install</li> <li>lighting circuit.</li> <li>Test the</li> <li>installation.</li> <li>Apply safety</li> <li>measures.</li> <li>Clean work</li> <li>area.</li> <li>Store tools,</li> <li>equipment and</li> <li>remaining</li> <li>materials.</li> </ul>		<ul> <li>one-way one-gang switch.</li> <li>Principles: The student should explain the principles of Installing lighting points controlled by one way one gang switch.</li> <li>Theories: The student should explain:</li> <li>Electrical symbols used in wiring diagram.</li> <li>Tools and equipment in wiring circuits.</li> <li>Effect of temperature in conducting materials.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions.</li> <li>IEE regulations.</li> </ul>	<ul> <li>Electrician knife</li> <li>Measuring tape</li> <li>Multimeter</li> <li>Claw hammer</li> <li>Set of screwdrivers</li> <li>Hacksaw</li> <li>Spirit level</li> <li>Safety boots</li> <li>Overall</li> <li>Leather/plastic</li> <li>Gloves</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Assessment Criteria Teaching and Learning		Training Requirements/ Suggested Resources	Number of Periods per Unit		
	es)			Process Assessment	Product/Service Assessment	Knowledge Assessment		
		(b) Installing lighting points controlled by one, two, and three-way gang switches.	<ul> <li>Questions and answers Ask questions and guide students to answer questions on defining one- way switch two gang.</li> <li>ICT-based Learning: Prepare a video clip showing all the steps related to installing lighting points controlled by one-way- two gang switch.</li> <li>Demonstrati on: Ddemonstrate to students all</li> </ul>	The student should be able to: Prepare electrical drawings. Identify tools, equipment, and required materials. Prepare accessories and cables for lighting circuits. Install lighting circuit. Test the installation. Apply safety measures. Clean work area. Store tools, equipment and remained materials.	Lighting circuits controlled by a one-way switch, two, three- gangs installed as per standards.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to install lighting points controlled by one, two, and three-way gang switches.</li> <li>Principles: The student should explain the principles of Installing lighting points controlled by one, two, and three-way gang switches.</li> <li>Theories: The student should explain:</li> <li>Electrical symbols used in wiring diagram.</li> <li>Tools and equipment used in wiring circuits.</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: Combination pliers Electrician knife Measuring tape Multimeter Claw hammer Set of screwdrivers Hacksaw Spirit level Safety boots Overalls Leather/plastic gloves	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			<ul> <li>procedures on how to Install lighting points controlled by one way two gang switch.</li> <li>Activity: Set the students in manageable small groups and guide them to Install lighting points controlled by one way two gang switch.</li> </ul>			<ul> <li>Effect of temperature in conducting materials.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions.</li> <li>IEE regulations.</li> </ul>		
		(c) Installing lighting points controlled by two two-way switches.	<ul> <li>Questions and answers Ask questions and guide students to answer questions on defining two two-way.</li> <li>ICT-based Learning:</li> </ul>	<ul> <li>The student should be able to:</li> <li>Prepare electrical drawings.</li> <li>Identify tools, equipment, and materials required.</li> </ul>	Lighting circuits controlled by two two-way switches installed as per standards.	Knowledge evidence:Detailed knowledgeof:Method used: Thestudent should explainhow to install lightingpoints controlled bytwo-way switches.Principles: The student	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>:</li> <li>Combination pliers</li> <li>Electrician knife</li> <li>Measuring tape</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning Methods		Assessment Criteria			Number of Periods per Unit
	es)			Process Assessment	Product/Service Assessment	Knowledge Assessment		
			<ul> <li>Prepare a video clip showing all the steps related to installing lighting points controlled by two-way way switch.</li> <li>Demonstrati on: demonstrate to student all procedures on how to Installing lighting points controlled by two two-way.</li> <li>Activity: Set the students in manageable small group and guide them to Installing lighting lighting</li> </ul>	<ul> <li>Prepare accessories and cables for lighting circuits.</li> <li>Install lighting circuit.</li> <li>Test the installation.</li> <li>Apply safety measures.</li> <li>Clean work area.</li> <li>Store tools, equipment and remained materials.</li> </ul>		<ul> <li>should explain the principles of installing lighting points controlled by two two-way switches controlled by one -way one gang switch.</li> <li>Theories: The student should explain:</li> <li>Electrical symbols used in wiring diagram.</li> <li>Tools and equipment used in wiring circuits.</li> <li>Effect of temperature in conducting materials.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions.</li> <li>IEE regulations.</li> </ul>	<ul> <li>Multimeter</li> <li>Claw hammer</li> <li>Set of screwdrivers</li> <li>Hacksaw</li> <li>Spirit level</li> <li>Safety boots</li> <li>Overalls</li> <li>Leather/plastic gloves</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci es)	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Decora	Assessment Crite	ria Knowledge	Training Requirements/ Suggested Resources	Number of Periods per Unit
				Assessment	Assessment	Assessment		
			points controlled by two two-way.					
		(d) Installing lighting points controlled by two-two-way switches and an intermediate switch.	<ul> <li>Questions and answers Ask questions and guide students to answer questions on defining intermediate switch.</li> <li>ICT-based Learning: Prepare a video clip showing all the steps related to installing lighting points controlled by two-two-way switches and an intermediate switch.</li> <li>Demonstration:</li> </ul>	<ul> <li>The student should be able to:</li> <li>Prepare electrical drawings.</li> <li>Identify tools, equipment, and materials required.</li> <li>Prepare accessories and cables for lighting circuits.</li> <li>Install lighting circuit.</li> <li>Test the installation.</li> <li>Apply safety measures.</li> <li>Clean work area.</li> <li>Store tools, equipment, and remained materials.</li> </ul>	Lighting circuits controlled by an intermediate switch installed as per standards.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to install intermediate switch.</li> <li>Principles: The student should explain the principles of Installing intermediate switch.</li> <li>Theories: The student should explain:</li> <li>Electrical symbols used in wiring diagram.</li> <li>Tools and equipment in wiring circuits.</li> <li>Effect of temperature in conducting materials.</li> <li>Circumstantial</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: Combination pliers Electrician knife Measuring tape Multimeter Claw hammer Set of screwdrivers Hacksaw Spirit level Safety boots Overalls Leather/plastic gloves	
Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
---------------------------------------	---	--------------------------------------	---	---	--	--	---	-------------------------------------
	es)	Methods	Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			<ul> <li>Demonstrate to students all procedures on how to install lighting points controlled by twotwo-way switch and intermediate switch.</li> <li>Activity: Set the students in manageable small groups and guide them to install lighting points controlled by two- two-way switch and intermediate switch.</li> </ul>			<ul> <li>knowledge</li> <li>Detailed knowledge</li> <li>about: <ul> <li>Safety precautions.</li> <li>IEE regulations.</li> </ul> </li> </ul>		
	2.4 Installing power circuits.	(a) Installing radial circuit.	• Questions and answers Guide the student to ask and answer	The student should be able to: • Interpret the	The radial power circuit installed as per standards.	Knowledge evidence: Detailed knowledge of: Method used: The	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are	61

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	ria	Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			<ul> <li>questions on defining radial circuit.</li> <li>Demonstrate -on: Demonstrate to the students the procedure for installing radial circuit.</li> <li>Activity: Set the students in small manageable groups to install a radial circuit.</li> </ul>	<ul> <li>architectural drawing wiring diagram.</li> <li>Identify tools, equipment, and materials.</li> <li>Prepare accessories and cables for power circuits.</li> <li>Install radial circuit.</li> <li>Make connections of all the final circuits at the consumer unit.</li> <li>Balance the circuits where necessary.</li> <li>Inspect the whole installation visually.</li> <li>Carry out tests.</li> <li>Clean work area.</li> </ul>		<ul> <li>student should explain how to install a radial circuit.</li> <li>Principles: The student should explain the principles of installing a radial circuit.</li> <li>Theories: The student should explain: <ul> <li>The application of a radial circuit.</li> <li>The application of cables, and other materials used in power circuits.</li> </ul> </li> <li>Circumstantial knowledge Detailed knowledge about: <ul> <li>Safety precautions</li> <li>Workplace accidents and incidents</li> </ul> </li> </ul>	to be available:	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
		(b) Installing ring circuit and spur.	<ul> <li>Questions and answers Guide the student to ask and answer questions on defining ring circuit.</li> <li>Demonstrate -on: Demonstrate to the studentas the procedure for installing ring circuit.</li> <li>Activity: Set the students in small manageable groups to install ring circuit.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret the architectural drawing wiring diagram.</li> <li>Identify tools, equipment, and materials.</li> <li>Prepare accessories and cables for power circuits.</li> <li>Install radial circuit.</li> <li>Make connections of all the final circuits at the consumer unit.</li> <li>Balance the circuits where necessary.</li> <li>Inspect the whole installation visually.</li> <li>Carry out tests. Clean work area.</li> </ul>	The ring and spur power circuit installed as per standards.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to install a ring circuit.</li> <li>Principles: The student should explain the principles of installing a ring circuit.</li> <li>Theories: The student should explain:</li> <li>The application of a ring circuit.</li> <li>The types of cables, and other materials used in power circuits.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about</li> <li>Safety precautions</li> <li>Workplace</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: : Combination pliers Electrician knife Measuring tape Multimeter Claw hammer Set of screwdrivers Hacksaw Spirit level Safety boots Overalls Leather/plastic gloves	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
						accidents and incidents		
		(c) Installing electric cooker circuit.	<ul> <li>Questions and answers Guide the student to ask and answer questions on defining electric cooker.</li> <li>Field visit: Oorganise students in groups or a whole class to visit a hotel kitchen to identify parts of electric cookers and their functions.</li> <li>Activity: Set the students in small manageable groups to install an</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret the architectural drawing wiring diagram.</li> <li>Identify tools, equipment, and materials.</li> <li>Prepare accessories and cables for power circuits.</li> <li>Install radial circuit.</li> <li>Make connections of all the final circuits at the consumer unit.</li> <li>Balance the circuits where necessary.</li> <li>Inspect the whole installation visually.</li> </ul>	Electric cooker power circuit installed as per standards.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to install an electric cooker circuit.</li> <li>Principles: The student should explain the principles of installing an electric cooker circuit.</li> <li>Theories: The student should explain:</li> <li>The application of an electric cooker circuit.</li> <li>The types of cables, and other materials used in power circuits.</li> <li>Circumstantial</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: : Combination pliers Electrician knife Measuring tape Multimeter Claw hammer. Set of screwdrivers Hacksaw Spirit level Safety boots Overalls Leather/plastic gloves.	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			electric cooker.	<ul> <li>Carry out tests.</li> <li>Clean work area.</li> </ul>		<ul> <li>knowledge</li> <li>Detailed knowledge</li> <li>about</li> <li>Safety precautions</li> <li>Workplace</li> <li>accidents</li> <li>and incidents</li> </ul>		
		(d) Installing the electric water heater circuit.	<ul> <li>Questions and answers Guide the student to ask and answer questions on defining electric water heater.</li> <li>Field visit: Organise students in groups or a whole class to visit hotel rooms to identify parts of electric water heaters</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret the architectural drawing wiring diagram.</li> <li>Identify tools, equipment, and materials.</li> <li>Prepare accessories and cables for power circuits.</li> <li>Install radial circuit.</li> <li>Make connections of all</li> </ul>	Electric water heater power circuit installed as per standards.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to install the electric water heater circuit.</li> <li>Principles: The student should explain the principles of installing the electric water heating circuit.</li> <li>Theories: The student should explain:</li> <li>Application of the</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: Combination pliers Electrician knife Measuring tape. Multimeter Claw hammer Set of screwdrivers Hacksaw Spirit level Safety boots Overalls Leather/plastic	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Suggested     Assessment Criteria       Teaching and     Learning		Training Requirements/ Suggested Resources	Number of Periods per Unit	
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			<ul> <li>and their functions.</li> <li>Activity: Set the students in small manageable groups to install electric cookers.</li> </ul>	<ul> <li>the final circuits at the consumer unit.</li> <li>Balance the circuits where necessary.</li> <li>Inspect the whole installation visually.</li> <li>Carry out tests.</li> <li>Clean work area.</li> </ul>		<ul> <li>electric water heater circuit.</li> <li>The types of cables, and other materials used in power circuits.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about</li> <li>Safety precautions</li> <li>Workplace accidents and incidents</li> </ul>	gloves	
	2.5 Installing alarm and signal circuits.	(a) Installing single-stroke bell.	<ul> <li>Questions and answers Guide the student to ask and answer questions on defining electric bell.</li> <li>Demonstrati- on: Demonstrate to the students the</li> </ul>	<ul> <li>The student should be able to:</li> <li>Draw an electrical diagram.</li> <li>Identify required tools, equipment, and safety gear.</li> <li>Prepare accessories and cables for installing single- stroke bells.</li> </ul>	<ul> <li>All terminations of a single-stroke bell are secured both mechanically and electrically sounding.</li> <li>Single-stroke bell fixed and arranged dimensionally.</li> </ul>	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge</li> <li>of:</li> <li>Method used: The student should explain how to install single - stroke bell.</li> <li>Test the installation</li> <li>Principles: The student should explain the principles of installing a single-stroke bell.</li> <li>Theories: The student</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: : Craw hammer Combination pliers Electrician knife Measuring tape Long nose pliers Multimeter	97

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	Training Requirements/ Suggested Resources	Number of Periods per Unit	
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			<ul> <li>procedure for installing electric bell.</li> <li>Activity: Arrange the students in small manageable groups to install electric bell.</li> </ul>	<ul> <li>Test the installation.</li> <li>Apply safety precautions.</li> <li>Clean work area.</li> <li>Store tools, equipment, and remained materials</li> </ul>		<ul> <li>should explain:</li> <li>Electrical symbols used in alarm and signal circuits.</li> <li>Types of materials used.</li> <li>Types of electric bells.</li> <li>Application of Single-stroke bell</li> <li>Types of bell transformers and their application.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge</li> <li>about safety precautions should be considered when selecting a type of alarm or signals for the particular use</li> </ul>	<ul> <li>Safety goggles</li> <li>Safety boots</li> <li>Overalls</li> <li>Junior hacksaw</li> <li>Cable cutter</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	7	Suggested Assessment Criteria Teaching and Learning		Training Requirements/ Suggested Resources	Number of Periods per Unit		
	es)			Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
		(b) Installing trembler bell.	•	Question and answer Guide the student to ask and answer question on defining trembler bell Demonstrati on: Demonstrate the student procedure for installing trembler bell Activity: Arrange the students in small manageable groups to installing trembler bell	<ul> <li>The student should be able to:</li> <li>Draw an electrical diagram.</li> <li>Identify required tools, equipment, and safety gear.</li> <li>Prepare accessories and cables for installing single-stroke bells.</li> <li>Test the installation.</li> <li>Install trembler bell.</li> <li>Apply safety precautions.</li> <li>Clean work area.</li> <li>Store tools, equipment, and remaining materials.</li> </ul>	<ul> <li>All terminations of a single-stroke bell are secured both mechanically and electrically in a sounding way.</li> <li>Single- bell fixed and arranged dimensionally.</li> </ul>	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to install a trembler bell.</li> <li>Test the installation</li> <li>Principles: The student should explain the principles of installing a trembler bell.</li> <li>Theories: The student should explain:</li> <li>Electrical symbols used in alarm and signal circuits.</li> <li>Types of electric trembler bells.</li> <li>The application of trembler bell.</li> <li>Types of bell transformers and their application.</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: : Craw hammer Combination pliers Electrician knife Measuring tape Long nose pliers Multimeter Safety goggles Safety boots Overalls Junior hacksaw Cable cutter	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
						Circumstantial knowledge		
						Detailed knowledge about		
						Ssafety precautions should be considered when selecting a type of alarm or signals for the particular use.		
		© Installing buzzer.	<ul> <li>Questions and answers Guide the student to ask and answer questions on defining a buzzer bell.Demonst rati-on: Demonstrate to the student the procedure for installing a buzzer bell.</li> <li>Activity: Arrange the students in small</li> </ul>	<ul> <li>The student should be able to:</li> <li>Draw an electrical diagram.</li> <li>Identify required tools, equipment, and safety gear.</li> <li>Prepare</li> <li>accessories and cables for installing single- stroke bells.</li> <li>Test the installation.</li> <li>Apply safety precautions.</li> </ul>	<ul> <li>All terminations of a buzzer are secured both mechanically and electrically sounding.</li> <li>A buzzer fixed and arranged dimensionally.</li> </ul>	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to install a buzzer.</li> <li>Test the installation.</li> <li>Principles: The student should explain the principles of installing a buzzer.</li> <li>Theories: The student should explain:</li> <li>Electrical symbols used in alarm and</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: : Craw hammer Combination pliers Electrician knife Measuring tape Long nose pliers Multimeter Safety goggles Safety boots Overalls Junior hacksaw	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			manageable groups to install a buzzer bell.	• Clean work area. Store tools, equipment, and remained materials		<ul> <li>signal circuits.</li> <li>Types of materials used.</li> <li>Types of electric buzzer.</li> <li>Application of an electronic buzzer.</li> <li>Types of bell transformers and their application.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about</li> <li>Safety precautions should be considered when selecting a type of alarm or signal for the particular use.</li> </ul>	Cable cutter	
		(d) Installing continuous ringing bell.	Questions     and answers     Guide the     students to     ask and     answer     questions on     defining	<ul> <li>The student should be able to:</li> <li>Draw an electrical diagram.</li> <li>Identify required tools, equipment, and</li> </ul>	• All continuous ringing bell terminations are secured mechanically and electrically sound.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to install a	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: :	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	Training Requirements/ Suggested Resources	Number of Periods per Unit	
	es)	,	Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			<ul> <li>continuous ringing bell.</li> <li>Demonstrati- on: Demonstrate to the students the procedure for a installing continuous ringing bell.</li> <li>Activity: Arrange the students in small manageable groups to install continuous ringing bells.</li> </ul>	<ul> <li>safety gear.</li> <li>Prepare accessories and cables for installing single- stroke bells.</li> <li>Test the installation.</li> <li>Apply safety precautions.</li> <li>Clean work area.</li> <li>Store tools, equipment, and the remaining materials.</li> </ul>	• Continuous ringing bells fixed and arranged dimensionally.	<ul> <li>continuous ringing bell.</li> <li>Test the installation.</li> <li>Principles: The student should explain the principles of installing a continuous ringing bell.</li> <li>Theories: The student should explain:</li> <li>Electrical symbols used in alarm and signal circuits.</li> <li>Types of materials used.</li> <li>Types of electric continuous ringing bells.</li> <li>The application of continuous ringing bells.</li> <li>The types of bell transformers and their application.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge</li> </ul>	<ul> <li>Craw hammer</li> <li>Combination pliers</li> <li>Electrician knife</li> <li>Measuring tape</li> <li>Long nose pliers</li> <li>Multimeter</li> <li>Safety goggles</li> <li>Safety boots</li> <li>Overalls</li> <li>Junior hacksaw</li> <li>Cable cutter</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Suggested Assessment Criteria Teaching and Learning		Training Requirements/ Suggested Resources	Number of Periods per Unit	
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
						<ul> <li>Ssafety precautions should be considered when selecting a type of alarm or signals for the particular use.</li> </ul>		
		(e) Installing indicator board.	<ul> <li>Brainstorm: Guide the student to define indicator boards.</li> <li>Practical work: Guide the student on the procedure for installing indicator boards.</li> <li>Activity: Arrange the students in groups to install indicator boards and test.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Draw an electrical diagram.</li> <li>Identify required tools, equipment, and safety gear.</li> <li>Prepare accessories and cables for installing single- stroke bells.</li> <li>Test the installation.</li> <li>Apply safety precautions.</li> <li>Clean work area.</li> <li>Store tools, equipment,</li> </ul>	<ul> <li>All terminations of an indicator board are secured both mechanically and electrically sounding.</li> <li>Indicator board fixed and arranged dimensionally.</li> </ul>	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to installan indicator board.</li> <li>Test the installation.</li> <li>Principles: The student should explain the principles of installing an indicator board.</li> <li>Theories: The student should explain:</li> <li>Electrical symbols used in alarm and signal circuits.</li> <li>Types of materials used.</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Craw hammer</li> <li>Combination pliers</li> <li>Electrician knife</li> <li>Measuring tape</li> <li>Long nose pliers</li> <li>. Multimeter</li> <li>Safety goggles</li> <li>Safety boots</li> <li>Overalls</li> <li>Junior hacksaw</li> <li>Cable cutter</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
				and the remaining materials		<ul> <li>Types of indicator board.</li> <li>Application of indicator boards.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about</li> <li>Ssafety precautions should be considered when selecting a type of alarm or signal for the particular use.</li> </ul>		
	2.6 Installing basic protective devices.	(a) Installing single- phase protective devices.	<ul> <li>Questions and answers Ask questions and guide students to answer questions on defining protective devices.</li> <li>ICT-based Learning: Prepare a video clip showing all the steps</li> </ul>	The student should be able to: • Identify types and ratings of circuit breakers. • Idenify types and rating of fuses. • Select the location for installing the circuit breaker. • Make holes	The protective devices are installed as per the manufacturer's manual specifications.	<ul> <li>Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to:</li> <li>Install single- phase protective devices.</li> <li>Principles: The student should explain the principles of installing single-phase protective devices.</li> <li>Theories: The student should explain:</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Set of spanners</li> <li>Set of semi-insulated screwdrivers</li> <li>Multimeter</li> <li>Workbench</li> <li>Safety boots</li> <li>Safety goggles</li> <li>Safety plastic and</li> </ul>	45

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	Training Requirements/ Suggested Resources	Number of Periods per Unit	
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			related to installing single-phase protective devices. Demonstrati- on: Demonstrate to student all procedures on how to single phase protective devices. Activity: Arrange the students in manageable small groups and guide them to install single- phase protective devices.	for fixing the circuit breaker. Fix the over current and earth leakage protective gears. Test the circuit breaker. Observe safety precautions Clean the work place. Store tools, equipment and remained materials.		<ul> <li>Types of electrical faults.</li> <li>The term protective devices.</li> <li>The major parts of protective devices.</li> <li>Power rating of the protective devices.</li> <li>The importance of the protective devices.</li> <li>Types of protective devices.</li> <li>Advantages and disadvantages of fuse and circuit breakers.</li> <li>Circumstantial knowledge Detailed knowledge about.</li> <li>Hazards Control Causes and control of defects.</li> </ul>	leather gloves Overalls Combination plier Long nose plier Side cutter plier Spirit level	
		(b) Installing three-phase pprotective devices.	Questions     and answers     Guide the     students to	The student should be able to: • Identify	The protective devices are installed as per the manufacturer's	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to install three-	This unit can be achieved at the workplace or training institution. The following tools, safety	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Wiethous	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			<ul> <li>ask and answer questions on defining protective device.</li> <li>Demonstrati- on: Demonstrate to the students the procedure for installing a protective device.</li> <li>Field visit: Organise students in groups or whole to visit Electrical sub station to identify three phase protective device</li> </ul>	<ul> <li>types and ratings of circuit breakers.</li> <li>Identify types and rating of fuses.</li> <li>Select the location for installing the circuit breaker.</li> <li>Make holes for fixing the circuit breaker.</li> <li>Fix the over current and earth leakage protective gears.</li> <li>Test the circuit breaker.</li> <li>Observe safety precautions.</li> <li>Clean the work place.</li> <li>Store tools, equipment and remaining materials.</li> </ul>	manual specifications.	<ul> <li>phase protective devices.</li> <li>Principles: The student should explain the principles of installing three-phase protective devices.</li> <li>Theories: The student should explain: <ul> <li>Types of electrical faults.</li> <li>The term protective devices.</li> <li>The major parts of protective devices.</li> <li>The power rating of the protective devices.</li> <li>The importance of the protective devices.</li> <li>The types of protective devices.</li> <li>The types of protective devices.</li> </ul> </li> <li>The types of protective devices.</li> <li>The types of protective devices.</li> <li>The advantages and disadvantages of fuse and circuit breakers.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge</li> </ul>	<ul> <li>gear, and equipment are to be available:</li> <li>Set of spanners</li> <li>Set of semi-insulated screwdrivers</li> <li>Multimeter</li> <li>Workbench</li> <li>Safety boots</li> <li>Safety plastic and leather gloves</li> <li>Overalls</li> <li>Combination plier</li> <li>Long nose plier</li> <li>Side cutter plier</li> <li>Spirit level</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	eria	Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
						<ul> <li>about</li> <li>Hazards control, causes and control of defects.</li> </ul>		
	2.7 Carrying out earthing System.	(a) Performing TT earthing methods.	<ul> <li>Questions and answers Guide the student to ask and answer questions on defining TT earthing methods.</li> <li>Demonstrati- on: Demonstrate to the student the procedure for installing TT earthing methods.</li> <li>Field visit: Organise students in groups or a</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and safety gear.</li> <li>Draw electrical TT earthing system diagrams.</li> <li>Identify the earthing electrodes.</li> <li>Install the TT earthing system.</li> <li>Test the function of the TT earthing system.</li> <li>Observe</li> </ul>	Acceptable TT earthing systems installed as per I.E.E. regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to install the TT earthing system.</li> <li>Principles: The student should explain the principles of performing earthing methods.</li> <li>Theories: The student should explain:</li> <li>Electrical symbols used in the earthing system.</li> <li>The terms "earthing, bonding, and grounding."</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: <ol> <li>Clamp on meter</li> <li>Megger meter</li> <li>Ground resistance meter</li> <li>Set of spanners</li> <li>Hoe</li> <li>Spade</li> <li>Set of screwdrivers</li> <li>Safety boots</li> <li>Safety goggles</li> <li>Plastic gloves</li> <li>Overalls.</li> </ol> </li> </ul>	65

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	Training Requirements/ Suggested Resources	Number of Periods per Unit	
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			whole class to visit an electrical sub station to identify TT earthing methods.	safety precautions. • Clean the workplace, tools, and equipment.		<ul> <li>The earth electrode.</li> <li>The earth fault loop impedance.</li> <li>The meaning of TT, IT, and TN systems.</li> <li>The application of TT, IT, and TN systems.</li> <li>Earth leakage.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>TT earthing systems.</li> </ul>		
		(b) Performing IT earthing method.	Questions and answers Guide the students to ask and answer questions on defining IT earthing	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and safety gear.</li> <li>Draw electrical diagrams for</li> </ul>	Acceptable IT earthing systems installed as per I.E.E. regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to install the IT earthing system.</li> <li>Principles: The student</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Clamp on meter</li> <li>Megger meter</li> <li>Ground resistance</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		<ul> <li>Methods</li> <li>methods.</li> <li>Demonstrate <ul> <li>-on:</li> <li>Demonstrate</li> <li>to the student</li> <li>the procedure</li> <li>for installing</li> <li>IT earthing</li> <li>methods</li> </ul> </li> <li>Field visit: <ul> <li>Organise</li> <li>students in</li> <li>groups or the</li> <li>whole class</li> <li>to visit the</li> <li>electrical sub</li> <li>station to</li> <li>identify IT</li> <li>earthing</li> <li>methods.</li> </ul> </li> </ul>	Process AssessmentITearthing system.Identifythe earthing electrodes.Install the IT earthing system.Testthe function of the IT earthing system.Observe safety precautions.Clean workplace, tools, and equipment.	Product/Service Assessment	<ul> <li>Knowledge Assessment</li> <li>should explain the principles of performing IT earthing methods.</li> <li>Theories: The student should explain:</li> <li>Electrical symbols used in the earthing system.</li> <li>The meaning of IT, and earthing systems.</li> <li>The application of IT systems.</li> <li>Earth leakage.</li> <li>Earth fault.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>IT earthing systems</li> </ul>	meter Set of spanners Hoe Spade Set of screwdrivers Safety boots Plastic gloves Overalls	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	ria	Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
		(c) Performing TN-S earthing method.	<ul> <li>Questions and answers Guide the student to ask and answer questions on defining TN- S earthing methods.</li> <li>Demonstrati on: Demonstrate the student procedure for installing TN- S earthing methods</li> <li>Field visit: Organise students in grops or whole to visit</li> </ul>	The studentshould be ableto:•Select tools, equipment, and safety gear.•Draw electrical for TN-S earthing system diagrams.•Identify the earthing electrodes.•Identify the earthing electrodes.•Install the rN-S earthing system.•Install the function	Acceptable TN-S earthing systems installed as per I.E.E. regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to install the TN-S earthing system.</li> <li>Principles: The student should explain the principles of performing TN-S earthing methods</li> <li>Theories: The student should explain:</li> <li>Electrical symbols used in the earthing system.</li> <li>The meaning of TN-S systems.</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Clamp on meter</li> <li>Megger meter</li> <li>Ground resistance meter</li> <li>Set of spanners</li> <li>Hoe</li> <li>Spade</li> <li>Set of screwdrivers</li> <li>Safety boots</li> <li>Safety goggles</li> <li>Plastic gloves</li> <li>Overalls</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
	(5)			Process Assessment	Product/Service Assessment	Assessment		
			Electrical sub station to identify TN-S earthing methods	<ul> <li>the TN-S earthing system.</li> <li>Observe safety precautions</li> <li>Clean the workplace, tools, and equipment.</li> </ul>		<ul> <li>The application of TN_S systems.</li> <li>Earth leakage.</li> <li>Earth fault</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>TN-S earthing systems.</li> </ul>		
		(d) Performing bonding of metal fixtures.	<ul> <li>Questions and answers Guide the students to ask and answer questions on defining bonding of metal fixtures.</li> <li>Demonstrati on: Demonstrate the student procedure for bonding of metal fixtures</li> </ul>	The student should be able to: • Select tools, equipment, and safety gear. • Draw electrical bonding of metal fixtures. • Observe safety precautions. • Clean the workplace, tools, and equipment.	Acceptable bonding of metal fixtures installed as per I.E.E. regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to perform bonding of metal fixtures.</li> <li>Principles: The student should explain the principles of performing bonding of metal fixtures.</li> <li>Theories: The student</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Clamp on meter</li> <li>Megger meter</li> <li>Ground resistance meter</li> <li>Set of spanners</li> <li>Set of screwdrivers</li> <li>Safety boots</li> <li>Safety goggles</li> <li>Plastic gloves</li> <li>Overalls</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning	Assessment Criteria			Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			Field visit: Organise students in grops or whole to visit electrical substation to identify bonding of metal fixtures.			<ul> <li>should explain:</li> <li>Electrical symbols used in the earthing system.</li> <li>The terms "bonding."</li> <li>The earth electrode.</li> <li>The meaning of bonding of metal fixtures.</li> <li>The application of bonding of metal fixtures.</li> <li>The earth fault Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Bonding of metal fixtures.</li> </ul>		
	2.8 Carrying out electrical tests.	(a) Carrying out verification of polarity test.	<ul> <li>Brainstorm: Guide the students to define the verification of the polarity test.</li> <li>Practical</li> </ul>	<ul> <li>The student should be able to:</li> <li>Draw an electrical diagram.</li> <li>Identify tools, equipment, and</li> </ul>	The verification of polarity test and data obtained conform to I.E.E. regulations.	Knowledge evidence:Detailed knowledgeof:Method used: Thestudent should explainhow to carry out the	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:	95

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	Training Requirements/ Suggested Resources	Number of Periods per Unit	
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			<ul> <li>work: Guide the students to identify procedures for verification of the polarity test.</li> <li>Activity: Arrange the students in groups to carry out the verification of polarity test.</li> </ul>	<ul> <li>materials</li> <li>required.</li> <li>Carry out</li> <li>visual inspection.</li> <li>Carry out</li> <li>tests using test</li> <li>instruments.</li> <li>Carry out</li> <li>verification</li> <li>of polarity</li> <li>test.</li> <li>Record test</li> <li>results in the</li> <li>record book.</li> <li>Analyse the</li> <li>recorded data.</li> <li>Observe</li> <li>safety</li> <li>precautions.</li> <li>Clean work</li> <li>area.</li> <li>Store tools,</li> <li>equipment, and</li> <li>the remaining</li> <li>materials.</li> </ul>		<ul> <li>verification of the polarity test.</li> <li>Principles: The student should explain the principles of carrying out verification of the polarity test.</li> <li>Theories: The student should explain: <ul> <li>Electrical symbols used.</li> <li>Testing procedures to undertake measurement.</li> <li>The importance of verification of polarity testing.</li> </ul> </li> <li>Circumstantial knowledge about: <ul> <li>Safety precautions on how to use</li> </ul> </li> </ul>	<ul> <li>Continuity tester</li> <li>Combination pliers</li> <li>Set of screwdrivers</li> <li>Test lamp</li> <li>Set of spanners</li> <li>Multimeter</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> <li>Plastic gloves</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	eria	Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
		(b) Carrying out insulation test.	<ul> <li>Brainstorm: Guide the student to define the insulation test.</li> <li>Practical work: Guide the students to identify procedures for carrying out insulation tests.</li> <li>Activity: Arrange the students in groups to carry out an insulation test.</li> </ul>	Assessment Assessment The student should be able to: • Draw an electrical diagram. • Identify tools, equipment, and materials required. • Carry out visual inspection. • Carry out tests using test instruments. • Carry out verification of polarity test. • Record test results in the record book.	The insulation test and data obtained conform to I.E.E. regulations.	Assessmenttesting instruments.Knowledge evidence:Detailed knowledge of:Detailed knowledge of:Method used: The student should explain how to carry out the insulation test.Principles: The student should explain the principles of carrying out an insulation test.Theories: The student should explain the principles of carrying out an insulation test.Theories: The student should explain:Electrical symbols used.The importance of insulation test.The student should explain:	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Continuity tester</li> <li>Megger/Insulation tester</li> <li>Combination pliers</li> <li>Set of screwdrivers</li> <li>Test lamp</li> <li>Set of spanners</li> <li>Multimeter</li> <li>Overall</li> <li>Safety boots</li> <li>Safety goggles</li> <li>Plastic gloves</li> </ul>	
				<ul> <li>Analyse the recorded data.</li> <li>Observe safety precautions.</li> <li>Clean work</li> </ul>		various tools and equipment. Circumstantial knowledge Detailed knowledge		

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	Training Requirements/ Suggested Resources	Number of Periods per Unit	
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
				<ul> <li>area.</li> <li>Store tools, equipment, and the remaining materials.</li> </ul>		<ul> <li>about:</li> <li>Safety precautions on how to use testing instruments.</li> </ul>		
		(c) Carrying out ring circuit test.	<ul> <li>Brainsto rm: Guide the student to define the ring circuit test.</li> <li>Practical work: Guide the student to identify procedures for carrying out ring circuit tests.</li> <li>Activity: Arrange the students in groups to carry out ring circuit tests.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Draw an electrical diagram.</li> <li>Identify tools, equipment, and materials required.</li> <li>Carry out visual inspection.</li> <li>Carry out tests using test instruments.</li> <li>Carry out verification of polarity test.</li> <li>Record test results in the record book.</li> </ul>	The ring circuit test and data obtained conform to I.E.E. regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to carry out the ring circuit test.</li> <li>Principles: The student should explain the principles of carrying out ring circuit tests.</li> <li>Theories: The student should explain: <ul> <li>Electrical symbols used.</li> <li>The importance of ring circuit test.</li> </ul> </li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Continuity tester</li> <li>Megger/Insulation tester</li> <li>Combination pliers</li> <li>Set of screwdrivers</li> <li>Test lamp</li> <li>Set of spanners</li> <li>Multimeter</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> <li>Plastic gloves</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	eria	Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
				<ul> <li>Analyse the recorded data.</li> <li>Observe safety precautions</li> <li>Clean work area.</li> <li>Store tools, equipment, and remained materials.</li> </ul>		<ul> <li>The uses of various tools and equipment.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions on how to use testing instruments.</li> </ul>		
		(d) Carrying out earthing test.	<ul> <li>Brainstorm: Guide the student to define an earthing test.</li> <li>Practical work: Guide the students to identify procedures for carrying out earthing tests.</li> <li>Activity: Arrange the students in groups to carry out earthing tests.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Draw an electrical diagram.</li> <li>Identify tools, equipment, and required materials.</li> <li>Carry out visual inspection.</li> <li>Carry out tests using test instruments.</li> <li>Carry out verification of polarity</li> </ul>	The earthing test and data obtained conform to I.E.E. regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to carry out an earthing test.</li> <li>Principles: The student should explain the principles of carrying out earthing tests.</li> <li>Theories: The student should explain: <ul> <li>Electrical symbols used.</li> </ul> </li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Continuity tester</li> <li>Megger/Insulation tester</li> <li>Combination pliers</li> <li>Set of screwdrivers</li> <li>Test lamp</li> <li>Set of spanners</li> <li>Multimeter</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	eria	Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
				test. • Record test results in the record book. • Analyse the recorded data. • Observe safety precautions. • Clean work area. • Store tools, equipment, and the remaining materials.		<ul> <li>The importance of earthing test.</li> <li>The uses of various tools and equipment.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions on how to use testing instruments.</li> </ul>	Plastic gloves	
		(e) Carrying out continuity test.	<ul> <li>Brainstorm: Guide the student to define continuity test.</li> <li>Practical work: Guide the student to identify procedures for carrying out continuity tests.</li> <li>Activity:</li> </ul>	<ul> <li>The student should be able to:</li> <li>Draw an electrical diagram.</li> <li>Identify tools, equipment, and materials required.</li> <li>Carry out visual inspection.</li> <li>Carry out tests using test instruments.</li> </ul>	The continuity test and data obtained conform to I.E.E. regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to carry out a continuity test.</li> <li>Principles: The student should explain the principles of carrying out the continuity test.</li> <li>Theories: The student</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>equipment should be available:</li> <li>Continuity tester</li> <li>Megger/Insulation tester</li> <li>Combination pliers</li> <li>Set of screwdrivers</li> </ul>	

Module Title (Main Competency )	Unit Title (Specific Competenci	Elements (Learning Activities)	Suggested Teaching and Learning		Assessment Crite	eria	Training Requirements/ Suggested Resources	Number of Periods per Unit
	es)		Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
			Arrange the students in groups to carry out continuity tests.	<ul> <li>Carry out verification of polarity test.</li> <li>Record test results in the record book.</li> <li>Analyse the recorded data.</li> <li>Observe safety precautions.</li> <li>Clean work area.</li> <li>Store tools, equipment, and the remaining materials.</li> </ul>		<ul> <li>should explain:</li> <li>Electrical symbols used.</li> <li>Testing procedures to undertake measurement.</li> <li>The importance of continuity testing.</li> <li>The uses of various tools and equipment.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions on how to use testing instruments.</li> </ul>	<ul> <li>Test lamp</li> <li>Set of spanners</li> <li>Multimeter</li> <li>Overall</li> <li>Safety boots</li> <li>Safety goggles</li> <li>Plastic gloves</li> </ul>	
		(f) Carryout open circuit test	Group discussion Guide students to present their work from literature on	<ul> <li>The student should be able to:</li> <li>Draw an electrical diagram.</li> <li>Identify tools, equipment, and</li> </ul>	The Open-circuit test and data obtained conform to I.E.E. regulations.	Knowledge evidence:Detailed knowledgeof:Method used: Thestudent should explainhow to carry out an	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:	

Module Title Unit 7 (Main Competency ) (Spec	Title Elements ccific (Learning petenci Activities)	Suggested Teaching and Learning		Assessment Crite	ria	Training Requirements/ Suggested Resources	Number of Periods per Unit
es	s)	Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment		
		<ul> <li>how to Carryout open circuit test.</li> <li>ICT-based Learning: Prepare a video clip on carrying open circuit test.</li> <li>Field visit: Organise students in groups or whole class to visit a nearby TANESCO sub station and carryout open circuit test.</li> </ul>	<ul> <li>materials</li> <li>required.</li> <li>Carry out</li> <li>visual inspection.</li> <li>Carry out</li> <li>tests using test</li> <li>instruments.</li> <li>Carry out</li> <li>verification</li> <li>of polarity</li> <li>test.</li> <li>Record test</li> <li>results in the</li> <li>record book.</li> <li>Analyse the</li> <li>recorded data.</li> <li>Observe</li> <li>safety</li> <li>precautions.</li> <li>Clean work</li> <li>area.</li> <li>Store tools,</li> <li>equipment, and</li> <li>the remaining</li> <li>materials.</li> </ul>		<ul> <li>open-circuit test.</li> <li>Principles: The student should explain the principles of carrying out open-circuit tests.</li> <li>Theories: The student should explain: <ul> <li>Electrical symbols used.</li> <li>Testing procedures to undertake measurement.</li> <li>The importance of verification of polarity testing.</li> <li>The uses of various tools and equipment.</li> </ul> </li> <li>Circumstantial knowledge about: <ul> <li>Safety precautions on how to use testing instruments.</li> </ul> </li> </ul>	<ul> <li>Continuity tester</li> <li>Megger/Insulation tester</li> <li>Combination pliers</li> <li>Set of screwdrivers</li> <li>Test lamp</li> <li>Set of spanners</li> <li>Multimeter</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> <li>Plastic gloves</li> <li>Projector</li> </ul>	

## FORM THREE

## Table 4: Detailed contents for Form Three

Module Title					Assessment Crit	eria	Training	Numbe
(Main Compet )	tency (Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
1.0 Buil simple A circuits.	ding 1.1 AC Constructing of simple heating circuits.	(a) Building circuit with heating coils in series.	<ul> <li>Group discussion Guide students to present their work from literature on how to build circuit with heating coils in series.</li> <li>ICT-based Learning: Prepare a video clip on building circuit with heating coils in series.</li> <li>Field visit: Organise students in groups or whole class to visit a nearby industry to identify circuit with heating coils in series</li> </ul>	<ul> <li>The student</li> <li>should be able to:</li> <li>Select tools, equipment and safety gear.</li> <li>Design a circuit diagram of the heating circuit.</li> <li>Prepare heating coils for connection.</li> <li>Build a series coils circuit.</li> <li>Supply power to the circuits.</li> <li>Perform power measurement.</li> <li>Test the</li> </ul>	Heating circuits are constructed in series as per IEE regulations and the test results conform to approved standards and theories.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to build a circuit with heating coils in series.</li> <li>Principles: The student should explain the principles related to building a circuit with heating coils in series.</li> <li>Theories: The student should explain:</li> <li>The Ohms law and its applications.</li> <li>The difference between resistance and impedance.</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: : :	24

Module Title	TT */ (T)*/1				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
				circuits. • Observe safety precautions.		<ul> <li>The measurement of current in the circuit.</li> <li>The measurement of voltage in the circuit.</li> <li>Detailed knowledge about:</li> <li>Safe handling of working tools and equipment.</li> <li>Safety rules</li> </ul>	<ul> <li>Power supply unit</li> <li>Set of screwdrivers</li> </ul>	
		(b) Building a circuit with heating coils in parallel.	<ul> <li>Questions and answers</li> <li>Guide students to ask and answer questions on how to build a circuit with heating coils in parallel.</li> <li>ICT-based Learning: Prepare a video clip on procedures for building circuit with heating coils in parallel.</li> <li>Field visit Organise students in groups or</li> </ul>	<ul> <li>The student</li> <li>should be able to:</li> <li>Select tools, equipment and safety gear.</li> <li>Design a circuit diagram of the heating circuit.</li> <li>Prepare heating coils for connection.</li> </ul>	Heating circuits are constructed in parallel per IEE regulations and the test results conform to approved standards and theories.	Knowledge evidence:Detailedknowledgeof:Methodused:Thestudentshouldexplainhow tobuilda circuitwithheatingcoilsinparallel.Principles:Theshouldexplaintheprinciplesrelatedtobuildinga circuitwithheatingcoilsinparallel	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: : : • Workbench • Electrician's tool kit • Soldering iron	

Module Title					Assessment Crit	eria	Training	Numbo
(Main Competency )	Unit Title (Specific Competencies )	Elements (Learning Activities)	ements earning tivities) Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			<ul> <li>whole class to visit a nearby industry to identify circuit with heating coils in parallel</li> <li>Activity: Arrange the students in groups to build a circuit with heating coils in parallel.</li> </ul>	<ul> <li>Build parallel coils circuit.</li> <li>Supply power to the circuits.</li> <li>Perform power measurement.</li> <li>Test the circuits.</li> <li>Observe safety precautions.</li> </ul>		<ul> <li>Theories: The student should explain:</li> <li>The difference between resistance and inductive reactance.</li> <li>The uses of various tools and equipment.</li> <li>I.E.E. Regulations.</li> <li>Measurement of current in the circuit.</li> <li>Measurement of voltage in the circuits.</li> <li>Detailed knowledge about:</li> <li>Safe handling of working tools and equipment</li> <li>Electrical hazards</li> <li>First aid</li> <li>Safety rules</li> <li>Precautions to be taken during working</li> </ul>	<ul> <li>Electrician's knife</li> <li>Multimeter</li> <li>Energy meter</li> <li>Power meter</li> <li>Measuring tape</li> <li>Overalls</li> <li>Safety goggles</li> <li>Power supply unit</li> <li>Set of screwdrivers</li> </ul>	
	Constructing a	(a) Constructing	<ul> <li>Questions and answers</li> </ul>	The student	Solenoid circuits are	Knowledge evidence: Detailed knowledge	This unit can be achieved at the	34

Module Title	TL: 4 TML.				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Suggested Resources	r of Periods per Unit
	simple magnetic circuit.	a circuit with a solenoid.	<ul> <li>Guide students to ask and answer questions on how to construct a circuit with a solenoid.</li> <li>ICT-based Learning: Prepare a video clip on procedure for cconstructing a circuit with a solenoid.</li> <li>Activity: Arrange the students in groups to cconstruct a circuit with a solenoid.</li> </ul>	<ul> <li>should be able to:</li> <li>Select tools, equipment and safety gear.</li> <li>Prepare heating coils for connection.</li> <li>Build a single heating coil circuit.</li> <li>Supply power to the circuits.</li> <li>Perform power measurement.</li> <li>Test the circuits.</li> <li>Observe safety precautions.</li> </ul>	constructed per IEE regulations and measured parameters conform to IEE regulations and standards.	<ul> <li>of:</li> <li>Method used: The student should explain how to cconstruct a circuit with a solenoid.</li> <li>Principles: The student should explain the principles related to cconstructing a circuit with a solenoid.</li> <li>Theories: The student should explain:</li> <li>Protection against electric shock.</li> <li>Effects of frequency on induction. Detailed knowledge about: <ul> <li>Safe handling of power circuits</li> <li>Properties of dielectric materials</li> <li>Precautions to</li> </ul> </li> </ul>	<ul> <li>workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>should be made available:</li> <li>Electrician's tool kit</li> <li>Combination pliers</li> <li>Electrician's knife</li> <li>Measuring tape</li> <li>Claw hammer</li> <li>Set of screwdrivers</li> <li>Leather gloves</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	

Module Title	T				Assessment Crit	eria	Training	Numbe
(Main Competency )	Unit Title (Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
						be taken when working on capacitive circuits.		
		(b) Constructing an electric bell.	<ul> <li>Questions and answers</li> <li>Guide students to ask and answer questions on how to cconstruct an electric bell.</li> <li>ICT-based Learning: Prepare a video clip on the procedure for constructing an electric bell.</li> <li>Activity: Arrange the students in groups to construct electric bells.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and safety gear.</li> <li>Design a circuit diagram of an electric bell.</li> <li>Wind a coil around an iron core.</li> <li>Connect an electric bell to an electric bell to an electric power.</li> <li>Solder the built circuits.</li> <li>Measure and record the parameters of the circuits.</li> </ul>	Electric bells are constructed per IEE regulations and measured parameters conform to IEE regulations and standards.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to cconstruct an electric bell.</li> <li>Principles: The student should explain the principles related to cconstructing an electric bell.</li> <li>Theories: The student should explain:</li> <li>The types of electric bells.</li> <li>The difference between a bell and a buzzer.</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: : Electrician' s tool kit Electrician' s knife Electrician' s knife Combinatio n pliers Electrician' s knife Claw hammer Set of screwdrivers Leather gloves Overalls	

Module Title	TT *4 /TT*41				Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
				<ul> <li>Apply safety precautions.</li> <li>Clean work area, tools, and equipment.</li> </ul>		<ul> <li>Detailed knowledge about:</li> <li>Safe handling of power. circuits</li> <li>Properties of dielectric materials</li> <li>Precautions to be taken when working on capacitive circuits.</li> </ul>	<ul> <li>Safety boots</li> <li>Safety goggles</li> </ul>	
		(c) Building	Questions and	The student	A simple	Knowledge evidence:	This unit can be	
		a simple transformer.	answers Guide the students	should be able to:	transformer constructed per	Detailed knowledge	achieved at the workplace or	
			<ul> <li>to ask and answer questions about defining a transformer.</li> <li><b>Demonstration:</b> Demonstrate the to the students the procedure for building a simple transformer.</li> </ul>	<ul> <li>Select tools, equipment, and safety gear.</li> <li>Design a circuit</li> </ul>	IEE regulations and measured parameters conforms to IEE regulations and standards.	<ul> <li>Method used: The student should explain how to build a simple transformer.</li> <li>Principles: The student should explain the</li> </ul>	<ul> <li>training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Electrician's tool kit</li> <li>Combination</li> </ul>	
			• Field visit: Organise students in groups or a whole class to visit a	diagram of a simple transformer. • Wind a coil		principles related to building a simple transformer.	<ul> <li>Combination pliers</li> <li>Electrician's knife</li> </ul>	

Module Title	I:4 T:41				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			<ul> <li>nearby industry to learn how to build a simple transformer.</li> <li>Activity: Arrange the students in small manageable groups to build a simple transformer.</li> </ul>	<ul> <li>around an iron core.</li> <li>Connect an electric transformer to an electric power.</li> <li>Solder the built circuits.</li> <li>Measure and record the parameters of the circuits.</li> <li>Apply safety precautions.</li> <li>Clean work area, tools, and equipment.</li> </ul>		<ul> <li>Theories: The student should explain:</li> <li>The types of transformers.</li> <li>The types of transformer windings.</li> </ul> Detailed knowledge about: <ul> <li>Safe handling of power circuits</li> <li>Properties of dielectric materials</li> <li>Precautions to be taken when working on capacitive circuits.</li> </ul>	<ul> <li>Measuring tape</li> <li>Claw hammer</li> <li>Set of screwdrivers</li> <li>Leather gloves</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	
	1.3 Constructing	(a) Constructing	Questions and answer     Guide the student to	The student	Single-pole	Knowledge evidence:	This unit can be	39
	simple filter circuits.	a single-pole RC filter.	<ul> <li>ask and answer questions on defining RC filter.</li> <li>Demonstration:</li> </ul>	<ul> <li>Select tools, equipment and safety gear.</li> </ul>	are constructed as per IEE regulations and the test results conform to	Detailedknowledgeof:Methodused:Thestudentshouldexplain	workplace or training institution. The following tools, safety gear, and equipment are to be	
Module Title					Assessment Crit	eria	Training	Numbo
--------------------------	---------------------------	--	---	---	---	---	--	-------
(Main Competency )	(Specific Competencies	Elements (Learning Activities)Suggested Teaching and Learning MethodsProcess AssessmentProduct/Servic e Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit		
			<ul> <li>Demonstrate to the students the procedure for constructing RC filter.</li> <li>Activity: Arrange the students in small manageable groups to cconstruct a single-pole RC filter.</li> </ul>	<ul> <li>Design a circuit diagram of the filter circuit.</li> <li>Build a low pass filter circuit (RC).</li> <li>Solder the built circuits.</li> <li>Measure and record the parameters of the circuits.</li> <li>Observe safety precautions.</li> <li>Clean work area, tools and equipment.</li> <li>Store tools, equipment and safety gear.</li> </ul>	approved standards.	<ul> <li>how to construct a single-pole RC filter.</li> <li>Principles: The student should explain the principles related to cconstructing a single-pole RC filter</li> <li>Theories: The student should explain:</li> <li>The behaviour of resistance in ac circuits.</li> <li>The behaviour of capacitance in ac circuits.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precaution on inductive load charges.</li> <li>Safety precaution when soldering the inductors.</li> </ul>	available: : Combination pliers Electrician's knife Measuring tape Set of screwdrivers Leather gloves Overalls Safety boots Safety goggles	

Module Title	I				Assessment Crit	eria	Training	Numbe
(Main Competency )	cy (Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
		(b)Building a passive LC filter.	<ul> <li>Brainstorm: Guide the student to define passive LC filter.</li> <li>Practical work: Guide the student to identify different types of passive LC filter.</li> <li>Activity: Arrangethe students in groups to construct a passive LC filter circuit.</li> </ul>	Thestudentshould be able to:••Select tools,equipmentand safetygear.•Design acircuitdiagram ofthe filter	Passive LC filter circuits are constructed as per IEE regulations and the test results conform to approved standards.	<ul> <li>Safe handling of working tools, equipment and an inductors.</li> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to cconstruct a single-pol LC filter.</li> <li>Principles: The student</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Combination	
				<ul> <li>circuit.</li> <li>Build a low pass filter circuit (LC).</li> <li>Solder the built circuits.</li> <li>Measure and record the parameters of the circuits.</li> <li>Observe safety precautions.</li> <li>Clean work area, tools</li> </ul>		<ul> <li>should explain the principles related to bbuilding a passive LC filter.</li> <li>Theories: The student should explain:</li> <li>Behaviour of inductance in ac circuits.</li> <li>Behaviour of capacitance in ac circuits.</li> </ul>	<ul> <li>Pliers</li> <li>Electrician's knife</li> <li>Measuring tape</li> <li>Set of screwdrivers</li> <li>Leather gloves</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	

Module Title	Unit Title				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
				and equipment. • Store tools, equipment and safety gear.		<ul> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precaution on inductive load charges.</li> <li>Safety precaution when soldering the inductors.</li> <li>Safe handling of working tools, equipment and inductors.</li> </ul>		
		(c) Building an RLC Filter.	<ul> <li>Questions and answers</li> <li>Ask questions and guide students to answer questions on defining RLC Filter.</li> <li>ICT-based Learning: Prepare a video clip showing all the steps related to installing RLC Filter.</li> </ul>	<ul> <li>The student</li> <li>should be able to</li> <li>Select tools, equipment and safety gear.</li> <li>Design a circuit diagram of the filter circuit.</li> </ul>	RLC filter circuits are constructed as per IEE regulations and the test results conform to approved standards.	Knowledge evidence:Detailed knowledgeof:Method used: Thestudent should explainhow to construct anRLC filter.Principles: The studentshould explain the	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Combination pliers</li> <li>Electrician's</li> </ul>	

Module Title	TT */ (T)*/1				Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			<ul> <li>Demonstration: Demonstrate to student all procedures on how to build RLC Filter devices.</li> <li>Activity: Arrange the students in manageable small groups and guide them to install RLC filter.</li> </ul>	<ul> <li>Build a low pass filter circuit (RLC).</li> <li>Solder the built circuits.</li> <li>Measure and record the parameters of the circuits.</li> <li>Observe safety precautions.</li> <li>Clean work area, tools and equipment.</li> </ul>		<ul> <li>principles related to building a passive RLC filter</li> <li>Theories: The student should explain:</li> <li>Behaviour of inductance, inductance and capacitance in AC circuits.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precaution on inductive load charges.</li> <li>Safety precaution when soldering the inductors.</li> <li>Safe handling of working tools, equipment and</li> </ul>	<ul> <li>knife</li> <li>Measuring tape</li> <li>Set of screwdrivers</li> <li>Leather gloves</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	

Module Title	TL-:4 T:41-				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
2. Installing cables and PVC cable. enclosures	2.1 Installing cables.	(a) Installing PVC cable.	<ul> <li>Questions and answers</li> <li>Ask questions and guide students to answer questions on how to iinstall a PVC cable.</li> <li>ICT-based Learning: <ul> <li>Prepare a video clip on the procedure for installing a PVC cable.</li> </ul> </li> <li>Activity: Arrange the students in small manageable groups to install a PVC cable.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment and safety gears.</li> <li>Interpret wiring drawings.</li> <li>Select an area for cable installation.</li> <li>Lay /mount the PVC cable and support it.</li> <li>Terminate PVC cable with appropriate termination kit.</li> <li>Observe safety precautions.</li> <li>Clean work area.</li> <li>Stora tools</li> </ul>	The installation of PVC cables was performed as per procedures prescribed by the I.E.E. regulations.	inductors. Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to install a PVC cable. Principles: The student should explain the principles related to installing PVC cable. Theories: The student should explain: The types of PVC cables and their uses. The application of PVC cables. The theory of estimating a cable size.	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Electrician's tool kit</li> <li>Combination pliers</li> <li>Electrician's knife</li> <li>Measuring tape</li> <li>Claw hammer</li> <li>Set of screwdrivers</li> <li>Cable pulling socks</li> <li>Leather gloves</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	50
				equipment and safety		• The type of materials for		

Module Title	TT */ (T)*/1				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Elements (Learning Activities) Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Suggested Resources	r of Periods per Unit
				gears.		manufacturing cables Circumstantial knowledge Detailed knowledge about: Regulations to cable installation.		
		(b) Installing paper insulated cable.	<ul> <li>Questions and answers</li> <li>Ask questions and guide students to answer questions on how to install paper insulated cable.</li> <li>ICT-based Learning: Prepare a video clip on the procedure for installing paper insulated cable.</li> <li>Activity: Set the students in small manageable groups to install paper insulated</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment and safety gears.</li> <li>Interpret wiring drawings.</li> <li>Select an area for cable installation.</li> <li>Lay /mount the paper insulated cable and support it.</li> <li>Terminate paper insulated</li> </ul>	The installation of paper insulated cables was performed as per procedures prescribed by the I.E.E. regulations.	Knowledge evidence:Detailed knowledgeof:Method used: Thestudent should explainhow to install paperinsulated cable.Principles: The studentshould explain theprinciples related toinstalling paperinsulated cable.Theories: The studentshould explain:	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Electrician's tool kit</li> <li>Combination pliers</li> <li>Electrician's knife</li> <li>Measuring tape</li> <li>Claw hammer</li> </ul>	

Module Title	TI*4 (T*4) -				Assessment Crit	Training	Numbe	
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	ements earning ctivities) Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			cable.	<ul> <li>cable with appropriate termination kit.</li> <li>Perform testing of the cable.</li> <li>Observe safety precautions.</li> <li>Clean work area.</li> <li>Store tools, equipment and safety gears.</li> </ul>		<ul> <li>insulated cables and their uses.</li> <li>The application of paper insulated Theory of estimating cable size.</li> <li>Type of materials for manufacturing cables.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about: <ul> <li>Safety measures to be observed while installing cables.</li> <li>IEE Regulations to cable installation.</li> </ul> </li> </ul>	<ul> <li>Set of screwdrivers</li> <li>Cable pulling socks</li> <li>Leather gloves</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	
		(c) Installing	Questions and	The student	The installation	Knowledge evidence:	This unit can be	
		Cable	answers	should be able to:	cables was	Detailed knowledge	workplace or	
			Ask questions and	• Select tools,	performed as	of:	training institution.	
			answer questions on	safety gears	per procedures	Method used: The	The following tools,	
			and the questions on	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	prescribed by		satety gear, and	

Module Title	TT */ (T)*/1				Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			<ul> <li>how to install Armoured Cable.</li> <li>ICT-based Learning: Prepare a video clip on the procedure for iinstalling Armoured Cable.</li> <li>Activity: Arrangethe students in small manageable groups to install Armoured Cable.</li> </ul>	<ul> <li>Interpret wiring drawings</li> <li>Select area for cable installation</li> <li>Lay /mount the Armoured Cable and support it.</li> <li>Terminate the Armoured Cable with appropriate termination kit.</li> <li>Perform testing of cable.</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Store tools, equipment and safety gears.</li> </ul>	the I.E.E. regulations.	<ul> <li>student should explain how to install Armoured Cable.</li> <li>Principles: The student should explain the principles related installing Armoured Cable.</li> <li>Theories: The student should explain:</li> <li>The types of Armoured Cable Cables and application.</li> <li>Application of Armoured Cable.</li> <li>Theory of estimating cable size.</li> <li>Type of material for manufacturing of cables.</li> <li>Circumstantial knowledge</li> </ul>	equipment are to be available: • Electrician's tool kit • Combination pliers • Electrician's knife • Measuring tape • Claw hammer • Set of screwdrivers • Cable pulling socks • Leather gloves • Overalls • Safety boots • Safety goggles	

Module Title	11:4 T:41-				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	ific (Learning Activities)	Elements (Learning CompetenciesSuggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
		(d) Performing underground wiring systems.	<ul> <li>Questions and answers</li> <li>Ask questions and guide students to answer questions on how to pperform underground wiring systems.</li> <li>ICT-based Learning: Prepare a video clip on</li> </ul>	The student should be able to: • Select tools, equipment and safety gears. • Interpret wiring drawings. • Select area for	The underground wiring system was installed as per procedures prescribed by the I.E.E. regulations.	Detailed knowledge about: • Safety measures to be observed while installing cables. • IEE Regulations to cable installation. Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to Perform underground wiring systems Principles: The student should	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Electrician's	
			<ul> <li>Prepare a video clip on the procedure for Performing underground wiring. systems</li> <li>Activity: Arrangethe students in small manageable groups to perform underground</li> </ul>	<ul> <li>Select area for cable installation.</li> <li>Lay /mount the Armoured Cable and support it.</li> <li>Terminate Armoured Cable with</li> </ul>		<ul> <li>The student should explain the principles related Performing underground wiring systems</li> <li>Theories: The student should explain</li> <li>Types of</li> </ul>	<ul> <li>tool kit</li> <li>Combination pliers</li> <li>Electrician's knife</li> <li>Measuring tape</li> <li>Claw hammer</li> <li>Set of screwdrivers</li> </ul>	

Module Title	TL-:4 (T)41-				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			wiring systems.	<ul> <li>appropriate termination kit.</li> <li>Perform testing of cable.</li> <li>Observe safety precautions.</li> <li>Clean work area.</li> <li>Store tools, equipmentan d safety gears.</li> </ul>		<ul> <li>underground wiring systems.</li> <li>Application of Armoured Cable.</li> <li>Theory of estimating cable size .</li> <li>Type of materials for manufacturing ables.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:         <ul> <li>Safety measures to be observed while installing cables.</li> <li>IEE Regulations to cable installation.</li> </ul> </li> </ul>	<ul> <li>Cable pulling socks</li> <li>Leather gloves</li> <li>Overall</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	
	2.2 Erecting conduits.	(a) Erecting PVC conduits.	Questions and answers Ask questions and guide students to answers questions on defining the PVC conduit.	The student should be able to: • Interpret	The PVC conduit system is securely mounted as per procedures	Knowledge evidence:Detailedknowledgeof:	This unit can be achieved at the workplace or training institution. The following tools,	42

Module Title	TT •4 (T)•41				Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			<ul> <li>ICT-based Learning: Prepare a video clip showing all the steps related to erecting PVC conduits.</li> <li>Demonstration: Demonstrate to student all procedures on how to erect PVC conduits.</li> <li>Activity: Arrange the students in manageable small groups and guide them to erecting PVC conduits.</li> </ul>	<ul> <li>architectural drawing.</li> <li>Draw electrical diagrams.</li> <li>Identify tools, equipment and materials required.</li> <li>Mark the conduit run.</li> <li>Cut/chase in the wall for conduits.</li> <li>Cut conduit for the required length.</li> <li>Make bends and corners.</li> <li>Mount the conduits and support them.</li> <li>Clean work area.</li> <li>Store tools, equipment and safety gears.</li> </ul>	prescribed by the I.E.E. regulations.	<ul> <li>student should explain how to Erect PVC conduits systems.</li> <li>Principles: The student should explain the principles related to erecting PVC conduits.</li> <li>Theories: The student should explain:</li> <li>The ttypes and size of conduit.</li> <li>The types of bends.</li> <li>The application of plastic conduits.</li> <li>Space factor of the conduit.</li> <li>Advantage and disadvantages of conduit wiring system.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> </ul>	safety gear, and equipment are to be available: Combination pliers Electrician knife Measuring tape Long nose pliers Claw hammer Set of screwdrivers Bench vice Bending block Bending machine Draw wire (snake wire) Round files Spirit level Chisel Chest drill machine Leather gloves Overalls Safety boots Safety goggles	

Module Title	TL-:4 (T)41-				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
						<ul> <li>Safety precautions on choosing conduit size.</li> <li>I.E.E. regulations</li> <li>Maintenance of buildings</li> </ul>		
		(b) Erecting galvanized conduit.	<ul> <li>Questions and answers         <ul> <li>Ask questions and guide students to answer questions on defining galvanized conduit.</li> </ul> </li> <li>ICT-based Learning:             <ul> <li>Prepare a video clip showing all the steps related to erecting galvanized conduits.</li> </ul> </li> <li>Demonstration:             <ul> <li>Demonstrate to students all procedures on how to erect galvanized conduits.</li> </ul> </li> <li>Activity: Arrange the students in manageable small groups and guide</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret architectural drawing.</li> <li>Draw electrical diagrams.</li> <li>Identify tools, equipment and materials required.</li> <li>Mark the conduit run.</li> <li>Cut/chase in the wall for conduits.</li> <li>Cut conduit for the required length.</li> <li>Make bends and corners.</li> </ul>	Galvanized conduit system securely mounted as per procedures prescribed by the I.E.E. regulations.	Knowledge evidence:Detailed knowledgeof:Method used: Thestudent should explainhow to erect galvanizedconduit systems.Principles: The studentshould explain theprinciples related toerecting galvanizedconduit.Theories: The studentshould explain:• The application ofmetal conduit.• The space factorof the conduit.• Advantage and	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Combination pliers • Electrician knife • Measuring tape • Long nose pliers • Claw hammer • Set of screwdrivers • Bench vice • Bending block • Bending machine • Draw wire (snake wire)	

Module Title	TT */ (T)*/1				Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			them to erecting galvanized conduits.	<ul> <li>Mount the conduits and support them.</li> <li>Terminate conduits with required boxes.</li> <li>Clean work area.</li> <li>Store tools, equipment and safety gears.</li> </ul>		disadvantages of metal conduit wiring system over plastic conduit. Circumstantial knowledge Detailed knowledge about: • Safety precautions on choosing conduit size. • I.E.E. regulations. • Maintenance of buildings	<ul> <li>Round files</li> <li>Spirit level</li> <li>Chisel</li> <li>Chest drill machine</li> <li>Leather gloves</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	
	2.3 Electing Trunking and cable tray.	(a) Erecting PVC trunking.	<ul> <li>Questions and answers         <ul> <li>Ask questions and guide students to answer questions on defining PVC trunking.</li> </ul> </li> <li>ICT-based Learning:         <ul> <li>Prepare a video clip showing all the steps related to erecting PVC</li> </ul> </li> </ul>	<ul> <li>The student should be able to:</li> <li>Draw the plan of the work.</li> <li>Identify tools, equipment and materials required.</li> <li>Perform marking out.</li> </ul>	Installation of PVC trunking performed as per technical specifications and IEE regulations.	Knowledge evidence:Detailed knowledgeof:Method used: Thestudent should explainhow to Erect PVCtrunking.Principles: The studentshould explain the	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:	41

Module Title	TT */ (T)*/1				Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			<ul> <li>trunking.</li> <li>Demonstration: Demonstrate to students all the procedures on how to erect PVC trunking.</li> <li>Activity: Arrange the students in manageable small groups and guide them to erect PVC trunking.</li> </ul>	<ul> <li>Cut the PVC trunking into the required size.</li> <li>Install PVC trunking.</li> <li>Check and verify the trunking installation.</li> <li>Apply safety precautions.</li> <li>Clean the work place.</li> <li>Store tools and the remaining materials.</li> </ul>		<ul> <li>principles related to erecting PVC trunking.</li> <li>Theories: The student should explain: <ul> <li>The types of trunking and their application.</li> <li>Construction of trunking and cable tray.</li> <li>Trunking space factors as per IEE Regulations.</li> <li>The advantage of PVC trunking.</li> </ul> </li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about: <ul> <li>Safe handling of special joints</li> <li>Safe handling of tools and equipment.</li> </ul> </li> </ul>		
		(b) Install	Questions and	The student	Installation of	Knowledge evidence:	This unit can be	

Module Title	TT */ (T)*/1				Assessment Crit	eria	Training	Numbe
(Main Competency )	Unit Title (Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
		skirting trunking.	<ul> <li>answers</li> <li>Ask questions and guide students to answers questions on defining skirting trunking.</li> <li>ICT-based Learning: Prepare a video clip showing all the steps related to erecting skirting trunking. Demonstration: Demonstrate to students all the procedures of installing the skirting trunking.</li> <li>Activity: Arrange the students in manageable small groups and guide them to erecting PVC.</li> </ul>	<ul> <li>should be able to:</li> <li>Draw the plan of the work.</li> <li>Identify tools, equipment and materials required.</li> <li>Perform marking out.</li> <li>Install skirting trunking.</li> <li>Check and verify the trunking installation.</li> <li>Install skirting trunking.</li> <li>Install cable trays.</li> <li>Apply safety precautions.</li> <li>Clean the work place.</li> <li>Store tools and the remaining</li> </ul>	skirting trunking performed as per technical specifications and IEE regulations.	<ul> <li>Detailed knowledge of the method used.</li> <li>The student should explain how to install skirting trunking.</li> <li>Principles: The student should explain the principles related to installing skirting trunking.</li> <li>Theories: The student should explain:</li> <li>Types of skirting trunking.</li> <li>Advantages of skirting trunking.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safe handling of special joints.</li> <li>Safe handling of tools and</li> </ul>	achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: : Junior hacksaw Hacksaw Set of spanners Set of spanners Set of files Overalls Safety boots Safety goggles Leather gloves Spirit level Hammer	

Module Title	I:4 T:410				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
		(c) Erecting cable trays.	<ul> <li>Questions and answers         <ul> <li>Ask questions and guide students to answer questions about defining cable trays.</li> </ul> </li> <li>ICT-based Learning:         <ul> <li>Prepare a video clip showing all the steps related to erecting cable trays.</li> <li>Demonstration:                 <ul> <li>Demonstration:</li> <li>Demonstrate to students the procedure on how to install cable trays.</li> <li>Activity: Arrange the students in manageable small groups and guide them to erect cable trays.</li> </ul> </li> </ul> </li> </ul>	<ul> <li>materials.</li> <li>The student should be able to:</li> <li>Draw the plan of the work.</li> <li>Identify tools, equipment and materials required.</li> <li>Perform marking out</li> <li>Cut the trunking into required size.</li> <li>Erecting cable trays</li> <li>Check and verify the trunking installation.</li> <li>Install skirting trunking.</li> <li>Install cable trays.</li> </ul>	The installation of the cable tray performed per technical specifications and IEE regulations.	equipment. Knowledge evidence: Detailed knowledge of the method used. The student should explain how to Erect cable trays. Principles: The student should explain the principles related to erecting cable trays. Theories: The student should explain: • The construction of cable trays. • Trunking space factors as per IEE Regulations. • Cable tray space factor as per IEE regulations. • Advantages of the	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: Junior hacksaw Junior hacksaw Hacksaw Set of screwdrivers Set of spanners Set of files Overalls Safety boots Safety goggles Leather gloves Spirit level Hammer	
				<ul><li> Apply safety precautions.</li><li> Clean the</li></ul>		cable tray. Circumstantial		

Module Title	TI: 4 (T) 41 -				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
				<ul> <li>work place.</li> <li>Store tools and the remaining materials.</li> </ul>		<ul> <li>knowledge</li> <li>Detailed knowledge</li> <li>about: <ul> <li>Safe handling of special joints.</li> <li>Safe handling of tools and equipment.</li> </ul> </li> </ul>		
	2.4 Constructing ducts and trenches.	(a) Constructing under-floor ducting system.	<ul> <li>Questions and answers</li> <li>Ask questions and guide students to answer questions on defining under-floor ducting system.</li> <li>ICT-based Learning: Prepare a video clip showing all the steps related to Constructing under-floor ducting system.</li> <li>Demonstration: Demonstrate to student all procedures on how to Constructing under-</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select materials, equipment and tools for installing ductscable trenches.</li> <li>Interpret drawings.</li> <li>Prepare site for construction of ducts and cable trench.</li> <li>Excavate site for ducts and installation</li> </ul>	The under-floor ducts conform to technical specifications and IEE Regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The student should explain how to Construct</li> <li>under-floor ducting system.</li> <li>Principles: The student should explain the principles related to constructing under- floor ducting system.</li> <li>Theories: The student should explain:</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Electrician's tool kit</li> <li>Hammer</li> <li>Lock Forming Machine.</li> <li>Shrimp Bend Machines.</li> <li>Hand drills.</li> <li>Excavator machines.</li> <li>Cable plastic</li> </ul>	40

Module Title	I				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	ents ning ities) Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Suggested Resources	r of Periods per Unit
			<ul> <li>floor ducting system.</li> <li>Activity: Arrange the students in manageable small groups and guide them to constructing under-floor ducting system.</li> </ul>	<ul> <li>Build ducts by concrete .</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Store tools, equipment and safety gear.</li> </ul>		<ul> <li>Types of ducts and its applications.</li> <li>The cconstruction of ducts.</li> <li>The advantage of ducts.</li> <li>Testing of ducts and cable trench.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety measures while constructing ducts and cable trench as per IEE Regulations .</li> <li>Hazards control</li> <li>Environmental safety</li> <li>Assessment guidance:</li> <li>Observation and conversation with the student while performing the</li> </ul>	protecting cover Safety boots Overalls Gloves Safety helmets Safety goggles	

Module Title	II: 4 (T) 41 -				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
		(b)	Brainstorm: Guide the	The student	The	<ul> <li>Oral and written questions.</li> <li>Product/ service assessment</li> </ul>	This unit can be	
		Constructing Underground Ducting System.	<ul> <li>Dranistorm. Guide the student to define underground ducting system.</li> <li>ICT-based Learning: Prepare a video clip showing all the steps related to constructing the Underground Ducting System.</li> <li>Demonstration: Demonstrate to students procedure for constructing the Underground Ducting System.</li> <li>Practical work: Guide the student to identify the procedures for constructing an underground ducting system.</li> <li>Activity: Arrange the</li> </ul>	<ul> <li>Select materials, equipment and tools for installing ducts and cable trenches.</li> <li>Interpret drawings.</li> <li>Prepare site for construction of underground ducts.</li> <li>Excavate site for underground ducts trench installation.</li> <li>Build ducts by concrete.</li> </ul>	underground ducting system conform to technical specifications and IEE Regulations.	<ul> <li>Detailed knowledge of the method used.</li> <li>The student should explain how to construct the Underground Ducting System.</li> <li>Principles: The student should explain the principles related to constructing the Underground Ducting System.</li> <li>Theories: The student should explain:</li> <li>Types of ducts and their applications.</li> <li>The cconstruction</li> </ul>	<ul> <li>achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Electrician's tool kit</li> <li>Hammer,</li> <li>Lock Forming Machine</li> <li>Shrimp Bend Machines</li> <li>Hand drill</li> <li>Excavator machines</li> <li>Cable plastic protecting cover</li> <li>Safety boots</li> <li>Overalls</li> <li>Gloves</li> <li>Safety helmets</li> <li>Safety goggles</li> </ul>	

Module Title		Unit Title (Specific Competencies ) Elements (Learning Activities) Suggested Teaching and Learning Methods			Assessment Crit	eria	Training	Numbo
(Main Competency )	Unit Title (Specific Competencies )		Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/       I         Suggested       I         Resources       I	r of Periods per Unit	
			students in groups to construct an underground ducting system.	<ul> <li>Test ducts and cable trench as per technical specifications.</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Store tools, equipment and safety gear.</li> </ul>		<ul> <li>of the underground ducts.</li> <li>The aadvantage of underground ducts.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety measures while constructing the ducts and cable trench as per IEE Regulations.</li> <li>Hazards control</li> <li>Environmental safety Assessment guidance:</li> <li>Observation and conversation with the student while performing the task.</li> <li>Oral and written questions.</li> <li>Product/ service assessment</li> </ul>		

Module Title	II: 4 (T) 41 -				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	nents urning vities)       Suggested Teaching and Learning Methods         Installing       Brainstorm: Guide the	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
		(c) Installing wall/under- wall bus- duct electrical rise.r	<ul> <li>Brainstorm: Guide the student to define the under-wall bus-duct electrical riser.</li> <li>Practical work: Guide the student to identify procedures for underwall-bus-duct electrical riser.</li> <li>Activity: Arrange the students in groups to install the wall/underwall bus-duct electrical riser.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select materials, equipment and tools for installing the wall/under- wall bus - duct.</li> <li>Interpret drawings.</li> <li>Prepare site for construction of wall/under- wall bus - duct.</li> <li>Excavate site for wall/under- wall bus - duct.</li> <li>Excavate site for wall/under- wall bus - duct.</li> <li>Build ducts by concrete.</li> <li>Test ducts and cable trench as per technical</li> </ul>	The wall/under- wall bus- duct electrical riser and cable trench conform to technical specifications and IEE Regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The student should explain how to install the wall/under-wall bus- duct electrical riser.</li> <li>Principles: The student should explain the principles related to installing the wall/under-wall bus - duct electrical riser.</li> <li>Theories: The student should explain:</li> <li>The advantage of wall/under-wall bus - duct electrical riser.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety measures</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Electrician's tool kit • Hammer • Lock forming machine • Shrimp bend machines • Hand drill • Excavator machines • Cable plastic protecting cover • Safety boots • Overalls • Gloves • Safety helmets • Safety goggles	

Module Title		tle			Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
				<ul> <li>specifications.</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Store tools, equipment and safety gear.</li> </ul>		<ul> <li>while constructing the ducts and cable trenches as per IEE Regulations.</li> <li>Hazards control</li> <li>Environmental safety <b>Assessment</b> guidance:</li> <li>Observation and conversation with the trainee while performing the task.</li> <li>Oral and written questions.</li> <li>Product/ sservice assessment</li> </ul>		
		(d) Constructing cable trenches.	<ul> <li>Brainstorm: Guide the student to define a cable trench.</li> <li>Practical work: Guide the student to identify the procedures for constructing a cable trench.</li> <li>Activity: Arrange the students in</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select materials, equipment and tools for installing ducts and cable trenches.</li> <li>Interpret</li> </ul>	The cable trench conforms to technical specifications and IEE Regulations.	Knowledge evidence:Detailed knowledge ofthe method used.The student shouldexplain how toconstruct cabletrenches.	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: should be made available:	

Module Title	TL: 4 (T) 41.				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			groups to construct a cable trench.	<ul> <li>drawings.</li> <li>Prepare site for construction of a cable trench.</li> <li>Excavate site for ducts and cable trenches installation.</li> <li>Test ducts and cable trenches as per technical specifications.</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Store tools, equipment and safety gear.</li> </ul>		<ul> <li>Principles: The student should explain the principles related to constructing cable trenches.</li> <li>Theories: The student should explain: <ul> <li>The cconstruction of trenches.</li> <li>The advantage of cable trenches.</li> </ul> </li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about: <ul> <li>Safety measures while constructing ducts and cable trenches as per IEE Regulations.</li> <li>Hazards control</li> <li>Environmental safety</li> </ul> </li> </ul>	<ul> <li>Electrician's tool kit</li> <li>Hammer</li> <li>Lock forming machine</li> <li>Shrimp bend machines</li> <li>Hand drill</li> <li>Excavator machines</li> <li>Cable plastic protecting cover</li> <li>Safety boots</li> <li>Overalls</li> <li>Gloves</li> <li>Safety helmets</li> <li>Safety goggles</li> </ul>	

Module Title	TL.: 4 (T) 41 -				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
						<ul> <li>Observation and conversation with the student while performing the task.</li> <li>Oral and written questions.</li> <li>Product/ service assessment</li> </ul>		
3.0 Installing switch gear and protective devices.	3.1 Installing three-phase switch gear.	(a) Installing three-phase distribution board.	<ul> <li>Brainstorm: Guide the student to define distribution board</li> <li>ICT -based Learning: Prepare a video clip showing all the procedures for installing three-phase distribution board.</li> <li>Demonstration Demonstrate procedures of three-phase distribution board.</li> <li>Practical work: Guide the student to identify steps for three-phase distribution board.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret single line and lay out drawings.</li> <li>Select tools, equipment and safety gear.</li> <li>Fix three phase distribution boards.</li> <li>Select the correct sizes of cables as indicated by</li> </ul>	Three-phase distribution board installed as per technical specifications and I.E.E. regulations	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The student should explain how to install three-phase distribution board.</li> <li>Principles: The student should explain the principles related to installing three-phase distribution board.</li> <li>Theories: The student should explain:</li> <li>Rating of MCBs</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Rawl plugs • A set of screwdrivers • Ball peen hammer • Cross peen hammer • Claw hammer	52

Module Title	TT •4 (TT)•41				Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			Activity: Arrange the students in groups to install three-phase distribution board.	<ul> <li>Connect final circuits to switch gears.</li> <li>Perform necessary tests.</li> <li>Observe safety.</li> </ul>		<ul> <li>Application of size of MCBs</li> <li>Operation of changeover switches</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Hazard control</li> <li>Workplace accidents and incidents</li> </ul>	<ul> <li>Megger</li> <li>Combination pliers</li> <li>Diagonal cutting pliers</li> <li>Electrician's knife</li> <li>Safety goggles</li> <li>Overalls</li> <li>Safety boots</li> </ul>	
		(b) Installing three-phase isolator.	<ul> <li>Brainstorm: Guide the student to define a three-phase isolator.</li> <li>ICT-based Learning: Prepare a video clip showing all the steps for installing a three-phase isolator.</li> <li>Demonstration Demonstrate the procedure for installing a three-phase isolator.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret a single line and lay out drawings.</li> <li>Select tools, equipment and safety gear.</li> <li>Fix three phase isolators.</li> <li>Select the</li> </ul>	The three-phase isolator installed as per technical specifications and I.E.E. regulations.	Knowledge evidence: Detailed knowledge of the method used. The student should explain how to install a three-phase isolator. Principles: The student should explain the principles related to installing a three-phase isolator.	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Rawl plugs</li> <li>A set of screwdrivers</li> <li>Ball peen hammer</li> </ul>	

Module Title					Assessment Crit	eria	Training	Numbo
(Main Competency ) ) (Spe Com	at Title becific mpetencies	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			<ul> <li>Practical work: Guide the student to identify procedures for installing a three- isolator installing three-phase isolator.</li> <li>Activity: Set the students in groups installing three-phase isolator.</li> </ul>	<ul> <li>correct sizes of cables as indicated by drawings.</li> <li>Connect final circuits to switch gears.</li> <li>Perform necessary tests.</li> <li>Observe safety precautions.</li> </ul>		<ul> <li>Theories: The trainee should explain:</li> <li>Function of isolator</li> <li>Application of isolator</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Hazard control</li> <li>Workplace accidents and incidents</li> </ul>	<ul> <li>Cross peen hammer</li> <li>Claw hammer</li> <li>Megger</li> <li>Combination pliers</li> <li>Diagonal cutting pliers</li> <li>Electrician's knife</li> <li>Safety goggles</li> <li>Overalls</li> <li>Safety boots</li> </ul>	
		(c) Installing a three-phase switch fuse.	<ul> <li>Brainstorm: Guide the student to define a three-phase switch fuse.</li> <li>ICT-based Learning: Prepare a video clip showing all the steps for installing three-phase switch fuse.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret single line and lay out drawings.</li> <li>Installing three-phase switch fuse.</li> <li>Select the correct sizes of cables as</li> </ul>	Three-phase switch fuse installed as per technical specifications and I.E.E. regulations.	Knowledge evidence: Detailed knowledge of the method used. The student should explain how to install a three-phase switch fuse. Principles: The student should explain the principles related to installing three-phase	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: : Rawl plugs	

Module Title					Assessment Crit	Assessment Criteria Training	Training	Numbo
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			<ul> <li>Demonstrate procedures for installing three-phase switch fuse</li> <li>Practical work: Guide the student to identify procedures for installing a three- isolator installing three-three-phase switch fuse.</li> <li>Activity: Arrange the students in groups installing three-phase switch fuse.</li> </ul>	<ul> <li>indicated by drawings.</li> <li>Connect final circuits to switch gears.</li> <li>Perform necessary tests.</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Collect all tools and other items for storage.</li> </ul>		<ul> <li>switch fuse.</li> <li>Theories: The trainee should explain:</li> <li>The term switch fuse.</li> <li>The types of fuse.</li> <li>The application fuse.</li> <li>The operation of fuse.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Hazard control</li> <li>Workplace accidents and incidents</li> </ul>	screwdrivers Ball peen hammer Cross peen hammer Claw hammer Megger Combination pliers Diagonal cutting pliers Electrician's knife Safety goggle. Overalls Safety boots	
		(d) Installing change-over switch.	Constructing underground ducting System.	The student should be able to: • Interpret single line and lay out drawings.	Change-over switch installed as per technical specifications and I.E.E. regulations	Knowledge evidence: Detailed knowledge of the method used. The student should explain how to install a	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be	

Module Title	TT */ (T)*/1				Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies )	Elements (Learning Activities) Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit	
				<ul> <li>Select tools, equipment and safety gear.</li> <li>Install manually operated change over switches.</li> <li>Install automatically operated change over switches.</li> <li>Connect final circuits to switch gears.</li> <li>Perform necessary tests.</li> <li>Observe safety precautions.</li> </ul>		<ul> <li>change-over switch.</li> <li>Principles: The student should explain the principles related to installing change-over switch.</li> <li>Theories: The student should explain:</li> <li>The types of change over switch.</li> <li>The application over switch.</li> <li>The operation of changeover switches.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Hazard control</li> <li>Workplace accidents and incidents</li> </ul>	<ul> <li>available:</li> <li>Rawl plugs</li> <li>A set of screwdrivers</li> <li>Ball peen hammer</li> <li>Cross peen hammer</li> <li>Claw hammer.</li> <li>Megger</li> <li>Combination pliers</li> <li>Diagonal cutting pliers</li> <li>Electrician's knife</li> <li>Safety goggles</li> <li>Overalls</li> <li>Safety boots</li> </ul>	

Module Title	I:4 T:41				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
		(e) Installing Power Factor Correction Facility.	<ul> <li>Brainstorm: Guide the student to define a Power Factor Correction Facility.</li> <li>ICT-based Learning: Prepare a video clip showing all the steps for installing power factor correction facility.</li> <li>Demonstration Demonstrate to students the procedures for installing Power Factor Correction Facility.</li> <li>Practical work: Guide the student to identify procedures for installing a three-isolator Power Factor Correction Facility.</li> <li>Activity: Arrange the students in groups for them to install Power Factor Correction Facility.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret single line and lay out drawings.</li> <li>Select tools, equipment and safety gear.</li> <li>Select the correct sizes of cables as indicated by drawings.</li> <li>Connect final circuits to switch gears.</li> <li>Perform necessary tests.</li> <li>Observe safety.</li> </ul>	Power factor correction facility installed as per technical specifications and I.E.E. regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The student should explain how to Install Power Factor Correction Facility.</li> <li>Principles: The student should explain the principles related to installing Power Factor Correction Facility.</li> <li>Theories: The student should explain:</li> <li>Power Factor Correction Facility</li> <li>Types of Power Factor Correction Facility.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Workplace</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Rawl plugs • A set of screwdrivers • Ball peen hammer • Cross peen hammer • Claw hammer • Megger • Combination pliers • Diagonal cutting pliers • Electrician's knife • Safety goggles • Overalls • Safety boots	

Module Title	Lin:4 Title				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	ents       Suggested Teaching and       Process       Product/Servic       Knowledge       Suggested         ities)       Learning Methods       Process       Assessment       Product/Servic       Knowledge       Assessment       Suggested         accidents and       Image: Suggested Teaching and Learning Methods       Image: Suggested Teaching and Learning Methods       Image: Suggested Teaching and Teachi	Requirements/ Suggested Resources	r of Periods per Unit			
						accidents and incidents		
	3.2 Installing three-phase gears.	(a) Installing three-phase over-current protective devices.	<ul> <li>Brainstorm: Guide the student to define an over-current protective device</li> <li>ICT-based Learning: Prepare a video clip showing all the steps for installing a three- phase over current protective device.</li> <li>Demonstration Demonstrate procedures for installing over-current protective devices.</li> <li>Practical work: Guide the student to identify procedures for installing an over-current protective devices correction facility.</li> <li>Activity: Arrange the students in groups to install over-current protective devices</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment and materials required.</li> <li>Interpret single line and lay out drawings.</li> <li>Fix three- phase protective device.</li> <li>Select the correct sizes of cables as indicated by drawings.</li> <li>Connect final circuits to protective devices.</li> <li>Perform all tests.</li> <li>Observe safety</li> </ul>	Three- phases over the current protective device installed as per technical specifications and I.E.E. regulations.	Knowledge evidence:Detailed knowledge ofthe method used.The student shouldexplain how to installthree-phase over-current protectivedevices.Principles: The studentshould explain theprinciples related toinstalling three-phaseover-current protectivedevices.Theories: The studentshould explain:• The major parts of protective devices.• The importance of the protective devices.• Circumstantial knowledge	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Set of spanners • Set of semi- insulated screwdrivers • Multimeter • Workbench • Safety boots • Safety goggles • Safety plastic and leather gloves • Overalls • Combination pliers • Long nose Side cutter pliers • Spirit level	44

Module Title	II:4 T:41				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
		(b) Installing	facility. <ul> <li>Brainstorm: Guide the</li> </ul>	precautions.	Three-phase	Detailed knowledge about: • Hazards control • Causes and control of defects Knowledge evidence:	This unit can be	
		three-phase earth leakage protective devices.	<ul> <li>student to define earth leakage protective devices.</li> <li>ICT-based Learning: Prepare a video clip showing all the steps for installing a three phase earth leakage protective device.</li> <li>Demonstration Demonstrate procedures for installing three-phase earth leakage protective devices.</li> <li>Practical work: Guide the student to identify the importance of an earth leakage</li> </ul>	<ul> <li>should be able to:</li> <li>Select tools, equipment and materials required.</li> <li>Interpret single line and lay out drawings.</li> <li>Mark-out locations for devices to be installed.</li> <li>Install three- phase earth leakage protective devices.</li> <li>Select the correct sizes of cables as indicated by</li> </ul>	earth leakage protective device installed as per technical specifications and I.E.E. regulations.	<ul> <li>Detailed knowledge of the method used.</li> <li>The student should explain how to iinstall three-phase earth leakage protective devices</li> <li>Principles: The student should explain the principles related to installing three-phase earth leakage protective devices.</li> <li>Theories: The student should explain:</li> <li>Types of earth leakage.</li> <li>The major parts of</li> </ul>	<ul> <li>achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Set of spanners</li> <li>Set of semi-insulated screwdrivers</li> <li>Multimeter</li> <li>Workbench</li> <li>Safety goggles</li> <li>Safety plastic and leather gloves</li> <li>Overalls</li> <li>Combination pliers</li> <li>Long nose s</li> </ul>	

Module Title	Unit Title			Assessment Crit	eria	Training	Numbe	
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			<ul> <li>protective device.</li> <li>Activity: Arrange the students in groups to install a three-phase earth leakage protective device</li> </ul>	<ul> <li>drawings.</li> <li>Connect final circuits to protective device.</li> <li>Perform all tests.</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Store tools, equipment and safety gear.</li> </ul>		earth leakage protective device. Circumstantial knowledge Detailed knowledge about: • Hazards control • Causes and control of defects	<ul> <li>Side cutter pliers</li> <li>Spirit level</li> </ul>	
		(c) Installing over-voltage and under- voltage protective devices.	<ul> <li>Brainstorm: Guide the student to define over-voltage and under-voltage protective devices.</li> <li>Demonstration         Demonstrate the procedures for installing over-voltage and under-voltage protective devices.     </li> <li>Practical work: Guide</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment and materials required.</li> <li>Interpret single line and lay out drawings.</li> <li>Mark-out locations for devices to be</li> </ul>	Over voltage/under voltage protective device installed as per technical specifications and I.E.E. regulations.	Knowledge evidence:Detailed knowledge of the method used.The student should explain how to install over-voltage and under- voltage protective devices.Principles: The student should explain the principles related to	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>tools and equipment should be available:</li> <li>Set of spanners</li> </ul>	

Module Title	II				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			<ul> <li>the student to identify the importance of overvoltage and undervoltage protective devices.</li> <li>Activity: Arrange the students in groups to install over-voltage and undervoltage protective devices.</li> </ul>	<ul> <li>installed.</li> <li>Fix the protective device.</li> <li>Select the correct sizes of cables as indicated by drawings.</li> <li>Connect final circuits to protective devices.</li> <li>Perform all tests.</li> <li>Observe safety precautions.</li> <li>Clean the work area</li> <li>Store tools, equipment and safety gear</li> </ul>		<ul> <li>installing over-voltage and under-voltage protective devices.</li> <li>Theories: The student should explain:</li> <li>The ttypes of over- voltage and under- voltage protective devices.</li> <li>The importance of over-voltage and under-voltage protective devices</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about.</li> <li>Hazards control</li> <li>Causes and control of defects</li> </ul>	<ul> <li>Set of semi- insulated screwdrivers</li> <li>Multimeter</li> <li>Workbench</li> <li>Safety boots</li> <li>Safety goggles</li> <li>Safety plastic and leather gloves</li> <li>Overalls</li> <li>Combination pliers</li> <li>Long nose</li> <li>Side cutter pliers</li> <li>Spirit level</li> </ul>	
	3.3 Performing metering and	(a) Measuring	• <b>Brainstorm:</b> Guide the student to define electric power.	The student should be able to:	Reading taken on both kVA	Knowledge evidence: Detailed knowledge of	This unit can be achieved at the	42

Module Title	TL-:4 TM:41-				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Elements (Learning Activities) Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Suggested Resources	r of Periods per Unit
	tariffing.	electric power.	<ul> <li>Practical work: Guide the student to identify the importance of measuring electric power.</li> <li>Demonstration Demonstrate the procedures for measuring electric power.</li> <li>Activity: Arrange the students in groups to measure electric power.</li> </ul>	<ul> <li>Identify Tanzania Electric Supply Company Limited (TANESCO) tarrifing categories.</li> <li>Read the electrical units consumed.</li> <li>Record the readings.</li> <li>Regrade data in tariff categories.</li> <li>Charging the data as per the tariff category.</li> <li>Store the data/reading to the respective areas.</li> </ul>	and kW meters recorded accurately	<ul> <li>the method used.</li> <li>The student should explain how to measure electric power.</li> <li>Principles: The student should explain the principles related to Measuring electric power.</li> <li>Theories: The student should explain:</li> <li>Electrical symbols used in metering and tarrifing.</li> <li>Different types of tariffs.</li> <li>The term metering and tarriffing.</li> <li>.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about: Safe handling of analogue and digital</li> </ul>	<ul> <li>workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Clamp on meter</li> <li>Voltmeter</li> <li>Ammeter</li> <li>Ohmmeter</li> <li>kWh meter</li> <li>kWh meter</li> <li>Set of screwdrivers</li> <li>Plastic gloves</li> <li>Safety goggles</li> <li>Overalls</li> <li>Safety boots</li> </ul>	

Module Title				Assessment Crit	eria	Training	Numbe
(Main Competency ) (Specific Competenci )	Elements (Learning es Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
	(b) Measuring electric energy (kWh and kVAh).	<ul> <li>Brainstorm: Guide the student to define electric energy protective devices.</li> <li>Practical work: Guide the student to identify steps for measuring electric energy.</li> <li>Activity: Arrange the students in groups to measure electric energy.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Identify TANESCOtar rifing categories.</li> <li>Read the electrical units consumed.</li> <li>Record the readings.</li> <li>Regrade data in tariff categories.</li> <li>Charging the data as per the tariff category.</li> <li>Store the data/reading to the respective areas.</li> </ul>	Reading taken on both kVAh and kWh cost, and billed.	<ul> <li>kilowatt meters.</li> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The student should explain how to measure electric energy.</li> <li>Principles: The student should explain the principles related to measuring electric energy.</li> <li>Theories: The student should explain:</li> <li>Methods of calculating customer electric bills.</li> <li>Different types of tariffs.</li> <li>The analogue and digital energy</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: t Clamp on meter Voltmeter Ammeter Ohmmeter KWh meter KWh meter Set of screwdrivers Plastic gloves Safety goggles Overalls Safety boots.	

Module Title					Assessment Crit	eria	Training	Numbo
(Main Competency )	Unit Title (Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
						<ul> <li>The term metering and tariffing.</li> <li>The uses of tools and equipment.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safe handling of analogue and digital kilowatt meters.</li> </ul>		
		(c) Tariff electricity	<ul> <li>Brainstorm: Guide the student to define electric tariff.</li> <li>Practical work: Guide the student to identify the importance of electric tariff.</li> <li>Activity: Arrange the students in groups to identify different types of tariff.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Identify TANESCOtar rifing categories.</li> <li>Read the electrical units consumed.</li> <li>Record the readings.</li> <li>Regrade data in tariff categories.</li> </ul>	Reading taken on both kVAh and kWh cost, and billed	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The student should explain how to measure electric tariff.</li> <li>Principles: The student should explain the principles related to electric tariff.</li> <li>Theories: The student should explain:</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Clamp on meter</li> <li>Voltmeter</li> <li>Ammeter</li> <li>Ohmmeter</li> <li>kWh meter</li> <li>kVA h meter</li> </ul>	
Module Title	TL-:4 T-41-	Elements (Learning Activities) Suggested Teaching and Learning Methods			Assessment Crit	eria	Training	Numbe
--------------------------	---	---	--	---	---	---	---	-------
(Main Competency )	(Specific Competencies )		Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit	
				<ul> <li>Charging the data as per the tariff category.</li> <li>Store the data/reading to the respective area.</li> </ul>		<ul> <li>Types of electric tariff.</li> <li>Ways of calculating electric tariff.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safe handling of analogue and digital kilowatt meters.</li> </ul>	<ul> <li>Set of screwdrivers</li> <li>Plastic gloves</li> <li>Safety goggles</li> <li>Overalls</li> <li>Safety boots</li> </ul>	
	3.4 Installing fire detection and alarm systems.	(a) Installing fire detecting and warning systems.	<ul> <li>Constructing Underground ducting System.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment and materials required.</li> <li>Interpret single line and lay out drawings.</li> <li>Mark-out locations for alarm system to be</li> </ul>	Fire detection and alarm system installed as per manufacturer's instructions and IEE regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The Student should explain how to install fire detecting and warning systems.</li> <li>Principles: The student should explain principles related to installing fire detecting and warning systems.</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: - • Installation manual • Electrician's tool kit	47

Module Title	TT */ (T)*/1				Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Elements (Learning Activities) Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
				<ul> <li>installed.</li> <li>Fix fire detectors and alarm system components.</li> <li>Select the correct sizes of cables as indicated by drawings.</li> <li>Connect final circuits to power supply.</li> <li>Perform all tests.</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Store tools, equipment and safety gear.</li> </ul>		<ul> <li>Theories: Students should explain;</li> <li>The purpose of fire alarm systems.</li> <li>Fire codes and standards.</li> <li>Analog fire detection system</li> <li>Digital fire detection system.</li> <li>Circumstantial knowledge:</li> <li>Detailed knowledge about:</li> <li>IEE Regulations and Safety precautions while working with fire and alarm systems.</li> <li>Fire fighting</li> <li>Properties of materials</li> <li>Assessment guidance:</li> <li>Observation and conversation with the student while performing the task.</li> </ul>	<ul> <li>Multimeter</li> <li>Hammer</li> <li>Spirit level</li> <li>Flash light</li> <li>Hydrometer</li> <li>Files</li> <li>Blower</li> <li>Vacuum cleaner</li> <li>Sets of</li> <li>spanners</li> <li>Overalls</li> <li>Safety boots</li> <li>Hand gloves</li> <li>Safety goggles</li> </ul>	

Module Title	II: 4 (T) 41 -				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
						• Oral and written questions. Product/service assessment		
		(b) Installing intrusion detecting systems.	<ul> <li>Brainstorm: Guide the student to define intrusion detecting system.</li> <li>Practical work: Guide the student to identify the importance of installing intrusion detecting systems.</li> <li>Activity: Arrange the students in groups to install intrusion detecting systems.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment and materials required.</li> <li>Interpret single line and lay out drawings.</li> <li>Mark-out locations for installing intrusion detecting systems.</li> <li>Install intrusion detecting systems.</li> <li>Select the correct sizes of cables as indicated by</li> </ul>	Intrusion detecting systems installed as per manufacturer's instructions and IEE regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The Student should explain how to install fire intrusion detecting systems.</li> <li>Principles: The student should explain principles related to intrusion detecting systems.</li> <li>Theories: The students should explain;</li> <li>The importance of intrusion detecting system.</li> <li>Circumstantial knowledge:</li> <li>Detailed knowledge</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Installation manual • Electrician's tool kit • Multimeter • Hammer • Spirit level • Flash light • Hydrometer • Files • Blower • Vacuum cleaner • Sets of spanners • Overalls	

Module Title					Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
				<ul> <li>drawings.</li> <li>Connect final circuits to power supply.</li> <li>Perform all tests.</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Store tools, equipment and safety gear.</li> </ul>		<ul> <li>about:</li> <li>IEE Regulations and Safety precautions while working with fire and alarm systems.</li> <li>Fire fighting</li> <li>Properties of materials</li> <li>Assessment guidance:</li> <li>Observation and conversation with a student while performing the task.</li> <li>Oral and written questions.</li> <li>Product/service assessment</li> </ul>	<ul> <li>Safety boots</li> <li>Hand gloves</li> <li>Safety goggles</li> </ul>	
		(c) Installing	Brainstorm: Guide the student to define	The student	Electric fence	Knowledge evidence:	This unit can be	
		fence.	electric fence.	Select tools,     equipment	manufacturer's instructions and	Detailed knowledge of the method used.	workplace or training institution.	
			Prepare a video clip showing all the procedures for	<ul> <li>and materials required.</li> <li>Interpret</li> </ul>	IEE regulations.	The Student should explain how to install electric fence.	The following tools, safety gear, and equipment are to be available:	
			installing electric fence.	and lay out		Principles: The student should explain		

Module Title	TL: 4 TML.				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			<ul> <li>Demonstration         Demonstrate the procedures             for installing electric fence.         </li> <li>Practical work: Guide             the student to identify             the steps for installing             electric fence.</li> <li>Activity: Arrange the             students in groups to             install electric fence.</li> </ul>	<ul> <li>drawings.</li> <li>Mark-out locations for installing electric fence.</li> <li>Install electric fence.</li> <li>Select the correct sizes of cables as indicated by drawings.</li> <li>Connect final circuits to power supply.</li> <li>Perform all tests.</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Store tools, equipment and safety gear.</li> </ul>		<ul> <li>principles related to installing electric fence.</li> <li>Theories: The students should explain;</li> <li>The types of electric fence.</li> <li>The importance of electric fence.</li> <li>Estimating material for fixing electric fence.</li> <li>Circumstantial knowledge:</li> <li>Detailed knowledge about:</li> <li>IEE Regulations and Safety precautions while working with fire and alarm systems.</li> <li>Fire fighting</li> <li>Properties of materials</li> <li>Assessment guidance:</li> <li>Observation and conversation with a student while</li> </ul>	be available: - Installation manual Electrician's tool kit Multimeter Hammer Spirit level Flash light Hydrometer Files Blower Vacuum cleaner Sets of spanners Overalls Safety boots Hand gloves Safety goggles	

Module Title	TI*4 (T*4) -				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
						<ul> <li>performing the task.</li> <li>Oral and written questions.</li> <li>Product/service assessment</li> </ul>		
		(d) Installing security and video surveillance systems (CCTV).	<ul> <li>Brainstorm: Guide the student to define security and video surveillance systems (CCTV).</li> <li>ICT -based Learning: Prepare a video clip showing all the procedures for installing security and video surveillance systems (CCTV).</li> <li>Demonstration</li> <li>Demonstrate the procedures for installing security and video surveillance systems (CCTV).</li> <li>Prepare a video clip showing all the procedures for installing security and video surveillance systems (CCTV).</li> <li>Prepare a video clip showing all the procedures for installing security and video surveillance surveillance surveillance systems (CCTV).</li> <li>Practical work: Guide</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment and materials required.</li> <li>Interpret single line and lay out drawings.</li> <li>Mark-out locations for alarm system to be installed.</li> <li>Fix fire detectors and alarm system components.</li> <li>Select the correct sizes of cables as</li> </ul>	Security and video surveillance systems (CCTV). installed as per manufacturer's instructions and IEE regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of the method used.</li> <li>The Student should explain how to install security and video surveillance systems (CCTV).</li> <li>Principles: The student should explain principles related to installing security and video surveillance systems (CCTV).</li> <li>Theories: Students should explain;</li> <li>The purpose of installing security and video surveillance</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: Installation manual Electrician's tool kit Multimeter Hammer Spirit level Flash light Hydrometer Files Blower Vacuum cleaner Sets of	

Module Title					Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			<ul> <li>the student to identify major components of the design solar PV system.</li> <li>Activity: Arrange the students in groups to install security and video surveillance systems (CCTV)</li> </ul>	<ul> <li>indicated by drawings.</li> <li>Connect final circuits to power supply.</li> <li>Perform all tests.</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Store tools, equipment and safety gear.</li> </ul>		<ul> <li>systems (CCTV).</li> <li>About estimating materials required for fixing CCTV.</li> <li>Circumstantial knowledge:</li> <li>Detailed knowledge about:</li> <li>IEE Regulations and Safety precautions while working with fire and alarm systems.</li> <li>Fire fighting</li> <li>Properties of materials</li> <li>Assessment guidance:</li> <li>Observation and conversation with a student while performing the task.</li> </ul>	<ul> <li>spanners</li> <li>Overalls</li> <li>Safety boots</li> <li>Hand gloves</li> <li>Safety goggles</li> </ul>	
4.0 Installing solar system.	4.1 Installing solar electric system.	(a) Designing solar PV system.	Brainstorm: Guide the student to define solar PV system.	Thestudentshould be able to:•Selecttools,equipment,andmaterials	Solar PV system system installed as per installation manual and IEE	Knowledge evidence: Method used: Detailed knowledge of:	This unit can be achieved at the workplace or training institution. The following tools,	90

Module Title					Assessment Crit	eria	Training	Numbo
(Main Competency )	Unit Title (Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			<ul> <li>ICT -based Learning: Prepare a video clip on designing solar PV system.</li> <li>Demonstration</li> <li>Demonstrate the procedures for designing solar PV system.</li> <li>Practical work: Guide the student to identify major components of design solar PV system.</li> <li>S</li> <li>Activity: Arrange the students in groups to design solar PV system.</li> </ul>	<ul> <li>required.</li> <li>Interpret single lines and layout drawings.</li> <li>Mark out locations for the solar system to be installed.</li> <li>Fix the solar system component.</li> <li>Perform necessary tests.</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Store tools, equipment, and safety gear.</li> </ul>	regulations.	<ul> <li>Method used: The student should explain how to design a PV solar power system.</li> <li>Principles: The student should explain the principle related to the design of the PV solar power system.</li> <li>Theories: The student should explain;</li> <li>Solar energy</li> <li>Renewable energy</li> <li>Conversion of dc to ac</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Properties of materials</li> </ul>	safety gear, and equipment are to be available: Electrician's tool kit Combination pliers Electrician's knife Measuring tape Long nose pliers Digital and analogue multimeters Ball peen hammer. Cross peen hammer Cable cutter Junior hacksaw Wire striper Overalls Safety boots Safety goggles	
		(b) Installing solar PV	<ul> <li>Questions and answers</li> </ul>	The student	Solar PV panel installed as per	Knowledge evidence:	This unit can be achieved at the	

Module Title	TL-:4 T:41-				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
		panel.	<ul> <li>Ask questions and guide students to answer questions on explaining about the PV panel.</li> <li>ICT-based Learning: Prepare a video clip on installing PV panel.</li> <li>Demonstration Demonstrate the procedures for installing the PV panel.</li> <li>Activity: Organise students in groups or whole class to install the PV panel.</li> </ul>	<ul> <li>should be able to:</li> <li>Select tools, equipment, and materials required.</li> <li>Interpret single lines and layout drawings.</li> <li>Mark out locations for the solar system to be installed.</li> <li>Fix the solar system components.</li> <li>Select the correct sizes of cables as indicated by drawings.</li> <li>Connect final circuits to the power supply.</li> <li>Perform necessary tests.</li> <li>Observe</li> </ul>	installation manual and IEE regulations.	<ul> <li>Method used:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to install a PV solar panel.</li> <li>Principles: The student should explain the principle related to the installation of PV solar panel.</li> <li>Theories: The student should explain;</li> <li>The solar energy</li> <li>Renewable energy</li> <li>Conversion of dc to ac</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Properties of materials</li> </ul>	<ul> <li>workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Electrician's tool kit</li> <li>Combination pliers</li> <li>Electrician's knife</li> <li>Measuring tape</li> <li>Long nose pliers</li> <li>Digital and analogue multimeters</li> <li>Ball peen hammer</li> <li>Cross peen hammer</li> <li>Cable cutter</li> <li>Junior hacksaw</li> <li>Wire striper</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	

Module Title	TT */ (T)*/1				Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
		(c) Installing charge controller.	<ul> <li>Questions and answers         <ul> <li>Ask questions and guide students to answer questions on explaining about charge controller.</li> <li>ICT-based Learning: Prepare a video clip on installing a charge controller.</li> </ul> </li> <li>Demonstration         <ul> <li>Demonstrate the procedures for installing a charge controller.</li> </ul> </li> <li>Demonstrate the procedures for installing a charge controller.</li> </ul>	<ul> <li>safety precautions</li> <li>Clean the work area.</li> <li>Store tools, equipment, and safety gear.</li> <li>The student should be able to:</li> <li>Select tools, equipment, and materials required.</li> <li>Interpret single lines and layout drawings.</li> <li>Mark out locations for nstalling charge controller.</li> <li>Install charge controller components.</li> <li>Select the</li> </ul>	Solar charge controller system installed as per installation manual and IEE regulations.	Knowledge evidence: Method used: Detailed knowledge of: Method used: The student should explain how to install a charge controller. Principles: The student should explain the principle related to the design of PV solar power system. Theories: The student should explain;	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available or. should be available: • Electrician's tool kit • Combination pliers • Electrician's knife • Measuring tape • Long nose pliers	
			whole class to install a charge controller.	correct sizes of cables as		<ul> <li>Solar energy</li> <li>Renewable energy</li> <li>Conversion of dc</li> </ul>	Digital and analogue	

Module Title					Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
				<ul> <li>indicated by drawings.</li> <li>Connect final circuits to the power supply.</li> <li>Perform necessary tests.</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Store tools, equipment, and safety gear.</li> </ul>		to ac Circumstantial knowledge Detailed knowledge about: Properties of materials	<ul> <li>multimeters</li> <li>Ball peen hammer</li> <li>Cross peen hammer</li> <li>Cable cutter</li> <li>Junior hacksaw</li> <li>Wire striper</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	
		(d) Installing batteries.	<ul> <li>Brainstorm: Guide the student to define batteries.</li> <li>Practical work: Guide the student to identify properties of voltage and current when batteries are connected in series and in parallel.</li> <li>Activity: Arrange the students in groups to</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and materials required.</li> <li>Interpret single lines and layout drawings.</li> </ul>	Solar batteries installed as per installation manual and IEE regulations.	Knowledge evidence:Method used:Detailed knowledgeof:Method used: Thestudent should explainhow to install batteries.Principles: The student	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Electrician's tool kit</li> </ul>	

Module Title	TT •4 (T)•41			Assessment Crit	eria	Training	Numbe	
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Elements (Learning Activities) Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			install batteries.	<ul> <li>Mark out locations for the solar system to be installed.</li> <li>Fix the solar system components.</li> <li>Select the correct sizes of cables as indicated by drawings.</li> <li>Connect final circuits to the power supply.</li> <li>Perform necessary tests.</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Store tools, equipment, and safety gear.</li> </ul>		<ul> <li>should explain the principle related to installing batteries.</li> <li>Theories: The student should explain;</li> <li>How to calculate battery voltage.</li> <li>How to calculate battery current.</li> <li>How to maintain battery.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Properties of materials</li> </ul>	<ul> <li>Combination pliers</li> <li>Electrician's knife</li> <li>Measuring tape</li> <li>Long nose pliers</li> <li>Digital and analogue multimeters</li> <li>Ball peen hammer</li> <li>Cross peen hammer</li> <li>Cable cutter</li> <li>Junior hacksaw</li> <li>Wire striper</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	
		(e) Installing	• <b>Discussion:</b> Guide the students to discuss	The student	Solar inverter	Knowledge evidence:	This unit can be	

Module Title	II:4 T:41			Assessment Criteria			Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
		inverters.	<ul> <li>about defining an inverter.</li> <li>ICT-based Learning: Prepare a video clip describing the procedures for installing inverters.</li> <li>Demonstration Demonstrate the procedures for installing inverters.</li> <li>Activity: Organise students in groups or whole class to iinstall inverters.</li> </ul>	<ul> <li>should be able to:</li> <li>Select tools, equipment, and materials required.</li> <li>Interpret single lines and layout drawings.</li> <li>Mark out locations for the solar inverter to be installed.</li> <li>Fix the solar inverter.</li> <li>Select the correct sizes of cables as indicated by drawings.</li> <li>Connect final circuits to the power supply.</li> <li>Perform necessary tests.</li> <li>Observe safety</li> </ul>	installed as per installation manual and IEE regulations.	<ul> <li>Method used:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to install solar inverter.</li> <li>Principles: The student should explain the principle related to installing solar inverter.</li> <li>Theories: The student should explain;</li> <li>The advantages of inverter.</li> <li>How to maintain an inverter?</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Properties of materials</li> </ul>	<ul> <li>achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Electrician's tool kit</li> <li>Combination pliers</li> <li>Electrician's knife</li> <li>Measuring tape</li> <li>Long nose pliers</li> <li>multimeters</li> <li>Ball peen hammer</li> <li>Cross peen hammer</li> <li>Cable cutter</li> <li>Junior hacksaw</li> <li>Wire striper</li> <li>Overalls</li> <li>Safety boots</li> </ul>	

Module Title	TT */ (T)*/1				Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies )	cific (Learning petencies Activities)	Elements (Learning Activities) Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
				<ul> <li>precautions.</li> <li>Clean the work area.</li> <li>Store tools, equipment, and safety gear.</li> </ul>			Safety goggles	
	4.2 Servicing solar electric system.	(a) Installing hybrid solar PV system.	<ul> <li>Brainstorm: Guide the student to define hybrid solar PV system.</li> <li>Practical work: Guide the student to identify steps for installing hybrid solar PV system.</li> <li>Activity: Arrange the students in groups to install the hybrid solar PV system.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and materials required.</li> <li>Interpret single lines and layout drawings.</li> <li>Mark out locations for the hybrid solar PV system.</li> <li>Select the correct sizes of cables as indicated by drawings.</li> <li>Connect final circuits to the</li> </ul>	Hybrid solar PV system installed as per installation manual and IEE regulations.	<ul> <li>Knowledge evidence:</li> <li>Method used:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to install hybrid solar PV system.</li> <li>Principles: The student should explain the principle related to installing hybrid solar PV system.</li> <li>Theories: The student should explain;</li> <li>Solar energy</li> <li>Renewable energy</li> <li>Conversion of dc to ac</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Electrician's tool kit</li> <li>Combination pliers</li> <li>Electrician's knife</li> <li>Measuring tape</li> <li>Long nose pliers</li> <li>multimeters.</li> <li>Ball peen hammer</li> <li>Cross peen hammer</li> </ul>	67

Module Title	II:4 T:410			Assessment Criteria			Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
				<ul> <li>power supply.</li> <li>Perform necessary tests.</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Store tools, equipment, and safety gear.</li> </ul>		Circumstantial knowledge Detailed knowledge about: Properties of materials	<ul> <li>Cable cutter</li> <li>Junior hacksaw</li> <li>Wire striper</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	
		(b) Upgrading solar PV system.	<ul> <li>Questions and answers         <ul> <li>Ask questions and guide students to answer about explaining the upgrading solar PV system.</li> </ul> </li> <li>ICT-based Learning:         <ul> <li>Prepare a video clip on upgrading solar PV system.</li> </ul> </li> <li>Demonstration Demonstrate the</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and materials required.</li> <li>Interpret single lines and layout drawings.</li> <li>Mark out locations for the solar system to be</li> </ul>	Solar PV system upgraded as per installation manual and IEE regulations.	Knowledge evidence:Method used:Detailed knowledgeof:Method used:The student should explainhow to upgrading solarPV system.Principles:The student should explainshould explain theprinciplerelated toupgrading solarPV	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: : Electrician's tool kit Combination pliers	

Module Title	TT */ (T)*/1				Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Suggested Resources	r of Periods per Unit
			procedures for upgrading solar PV system. Activity: Organise students in groups or whole class to uupgrading solar PV system.	<ul> <li>installed.</li> <li>Fix the solar system components.</li> <li>Select the correct sizes of cables as indicated by drawings.</li> <li>Connect final circuits to the power supply.</li> <li>Perform necessary tests.</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Store tools, equipment, and safety gear.</li> </ul>		<ul> <li>system.</li> <li>Theories: The student should explain;</li> <li>The importance of upgrading solar PV system.</li> <li>The Methods used to upgrade solar PV system.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about: <ul> <li>Properties of materials</li> </ul> </li> </ul>	<ul> <li>Electrician's knife</li> <li>Measuring tape</li> <li>Long nose pliers</li> <li>Digital and analogue multimeters</li> <li>Ball peen hammer</li> <li>Cross peen hammer</li> <li>Cable cutter</li> <li>Junior hacksaw</li> <li>Wire striper</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	
		(c) Servicing solar PV system.	Questions and answers     Ask questions and guide students to answer on explaining about solar     DV sustam	The student should be able to: • Select tools, equipment, and materials	Solar PV system serviced as per manufacture's manual.	Knowledge evidence: Method used: Detailed knowledge	This unit can be achieved at the workplace or training institution. The following tools,	

Module Title	TT *4 /TT*41				Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			<ul> <li>ICT-based Learning: Prepare a video clip on servicing solar PV system.</li> <li>Demonstration Demonstrate the procedures for servicing the solar PV system.</li> <li>Activity: Organise students in groups or whole class to service solar PV system.</li> </ul>	<ul> <li>required.</li> <li>Interpret single lines and layout drawings.</li> <li>Mark out locations for the solar system to be installed.</li> <li>Fix the solar system components.</li> <li>Select the correct sizes of cables as indicated by drawings.</li> <li>Connect final circuits to the power supply.</li> <li>Perform necessary tests.</li> <li>Observe safety precautions.</li> <li>Clean the work area.</li> <li>Store tools,</li> </ul>		<ul> <li>of:</li> <li>Method used: The student should explain how to service solar PV system.</li> <li>Principles: The student should explain the principle related to sservicing solar PV system.</li> <li>Theories: The student should explain;</li> <li>The advantages of servicing solar PV system.</li> <li>Renewable energy.</li> <li>Conversion of dc to ac</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Properties of materials</li> </ul>	<ul> <li>safety gear, and equipment are to be available:</li> <li>Electrician's tool kit</li> <li>Combination pliers</li> <li>Electrician's knife</li> <li>Measuring tape</li> <li>Long nose pliers</li> <li>Multimeters</li> <li>Ball peen hammer</li> <li>Cross peen hammer</li> <li>Cable cutter</li> <li>Junior hacksaw</li> <li>Wire striper</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	

Module Title	TL-14 (T)41-				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies ) Elements (Learning Activities) Suggested Teaching and Learning Methods Ass		Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit	
				equipment, and safety gear.				
5.0 Performing maintenance of electrical systems.	5.1 Carrying out preventive maintenance.	(a) Carrying out mechanical inspection.	<ul> <li>Questions and answers         <ul> <li>Ask questions and guide students to answer about explaining mechanical inspection.</li> </ul> </li> <li>ICT-based Learning:         <ul> <li>Prepare a video clip on carrying out mechanical inspection.</li> </ul> </li> <li>Demonstration         <ul> <li>Demonstrate the procedures for carrying out mechanical</li> </ul> </li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret electrical diagram.</li> <li>Carry out visual and thorough inspection to locate the defective area.</li> <li>Rectify the identified fault.</li> </ul>	Electrical inspection implemented according to maintenance instruction manual specifications.	Knowledge evidence:Detailedknowledgeof:Methodused:The student should explainhow to carry outmechanical inspection.Principles:The studentshouldexplaintheprinciplesrelatedtocarrying out mechanicalinspection.Theories:The student	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: : Electrical toolbox Megger Multimeter Insulation tester	36

Module Title	TT •4 (T)•41				Assessment Crit	eria	Training	Numbo
(Main Competency )	(Specific Competencies	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			<ul> <li>Activity: Organise students in groups or whole class to carrying out mechanical inspection.</li> </ul>	<ul> <li>Carry out test.</li> <li>Prepare schedule for maintenance.</li> <li>Clean the work area.</li> <li>Collect tools, equipment and other items for storage.</li> </ul>		<ul> <li>should explain:</li> <li>Types of preventive maintenance.</li> <li>The importance of preventive maintenance.</li> <li>Testing skills.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Remedial action given priority.</li> <li>I.E.E. regulation</li> </ul>	<ul> <li>Safety boots</li> <li>Hand gloves</li> <li>Safety glasses</li> <li>Overalls</li> </ul>	
		(b) Carrying out electrical inspection.	<ul> <li>Brainstorm: Guide the student to electrical inspection.</li> <li>Practical work: Guide the student to identify the importance of making electrical inspection.</li> <li>Activity: Arrange the students in</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret electrical diagram.</li> <li>Carry out visual and thorough inspection to locate the defective</li> </ul>	Electrical inspection implemented according to maintenance instruction manual specifications.	Knowledge evidence:Detailedknowledgeof:Methodused:Thestudentshouldexplainhowtocarryoutelectricalinspection.Principles:Thestudentshouldexplainthe	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>be available:</li> <li>Electrical tool</li> </ul>	

Module Title	TT */ (T)*/1				Assessment Crit	Training	Numbo	
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
			groups to carry out electrical inspection.	<ul> <li>area.</li> <li>Rectify the identified fault.</li> <li>Carry out test.</li> <li>Prepare schedule for maintenance.</li> <li>Clean the work area.</li> <li>Collect tools, equipment and other items for storage.</li> </ul>		<ul> <li>principles related to carrying out electrical inspection.</li> <li>Theories: The student should explain:</li> <li>The importance of preventive maintenance.</li> <li>Testing skills.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Inspection procedures</li> <li>Remedial action given priority</li> <li>I.E.E. regulations</li> </ul>	box Megger Analogue multimeter Digital multimeter Insulation tester Safety boots Hand gloves Safety glasses Overalls	
		(c) Carrying out remedial action.	<ul> <li>Brainstorm: Guide the student to define remedial action.</li> <li>Practical work: Guide the student to identify the importance of</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret electrical diagram.</li> <li>Carry out visual and</li> </ul>	Remedial action carried out as per specification.	Knowledge evidence:Detailedknowledgeof:Methodused:Methodused:Thestudentshouldexplainhowtocarryout	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be	

Module Title	TT */ (T)*/1				Assessment Crit	eria	Training	Numbo	
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Specific Competencies Elements (Learning Activities) Suggested Teac Learning Metho	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Suggested Resources	r of Periods per Unit
			carrying out remedial action. • Activity: Set the students in groups to carry out remedial action.	<ul> <li>thorough inspection to locate the defective area.</li> <li>Rectify the identified fault.</li> <li>Carry out test.</li> <li>Prepare schedule for maintenance.</li> <li>Clean the work area.</li> </ul>		remedial action. <b>Principles:</b> The student should explain the principles related to carrying out remedial action. <b>Theories:</b> The student should explain: • The importance of carrying out remedial action. <b>Circumstantial</b> <b>knowledge</b> <b>Detailed knowledge</b> <b>about:</b> • Remedial action given priority • I.E.E. regulations	<ul> <li>available:</li> <li>Electrical tool box</li> <li>Megger</li> <li>Analogue multimeter</li> <li>Digital multimeter</li> <li>Insulation tester</li> <li>Safety boots</li> <li>Hand gloves</li> <li>Safety glasses</li> <li>Overalls</li> </ul>		

Module Title	TT */ (T)*/1				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
		(d) Prepare schedules for each machinery.	<ul> <li>Brainstorm: Guide the student to define maintenance schedule.</li> <li>Practical work: Guide the student to identify the importance of preparing maintenance schedule.</li> <li>Activity: Arrange the students in groups to prepare maintenance schedule for each machine.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret electrical diagram.</li> <li>Carry out visual and thorough inspection to locate the defective area.</li> <li>Carry out test.</li> <li>Prepare schedule for maintenance.</li> <li>Clean the work area.</li> <li>Collect tools, equipment and other items for storage.</li> </ul>	Maintenance schedule for each machine prepared as per manufacture's specifications.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to prepare schedules for each machinery.</li> <li>Principles: The student should explain the principles related to preparing schedules for each machinery.</li> <li>Theories: The student should explain:</li> <li>The importance of maintenance schedule.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about: <ul> <li>Inspection procedures.</li> <li>Remedial action given priority.</li> <li>I.E.E. regulation</li> </ul> </li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: t should be available: • Electrical toolbox • Megger • Analogue multimeter • Digital multimeter • Insulation tester • Safety boots • Hand gloves • Safety glasses • Overalls	

Module					Assessment Crit	eria	Training	NT 1
(Main Competency )	Unit Title (Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	Numbe r of Periods per Unit
	5.2 Carrying out corrective maintenance.	(a) Carrying out mechanical and electrical inspection.	<ul> <li>Questions and answers</li> <li>Ask questions and guide students to answer questions on explaining how to ccarry out mechanical and electrical inspection.</li> <li>ICT-based Learning: Prepare a video clip on carrying out mechanical and electrical inspection.</li> <li>Demonstration</li> <li>Demonstrate the procedures for Carrying out mechanical and electrical inspection.</li> <li>Activity: Organise students in groups or whole class to carry out mechanical and electrical inspection.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret electrical diagram.</li> <li>Carry out visual and thorough inspection to locate the defective area.</li> <li>Carry out test of a circuit.</li> <li>Apply safety precautions.</li> <li>Clean the work area.</li> <li>Collect tools, equipment and other items for storage.</li> </ul>	Mechanical and electrical inspection implemented according to to maintenance instruction manual specification.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to carry out mechanical and electrical inspection.</li> <li>Principles: The student should explain the principles related to carrying out mechanical and electrical inspection.</li> <li>Theories: The student should explain:</li> <li>The term corrective maintenance.</li> <li>The maintenance schedule.</li> <li>Circumstantial knowledge Detailed knowledge about:</li> <li>Safety and health protection gears</li> <li>Safe handling of tools and equipment.</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: : Electrical tool box Megger Analogue and digital multimeter Insulation tester Safety boots Hand gloves Safety glasses Overalls Clamp-on meter Relay test set	30

Module					Assessment Crit	eria	Training	
(Main Competency )	Unit Title (Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	Numbe r of Periods per Unit
		(b) Dismantling and assembling of electrical machines.	<ul> <li>Brainstorm: Guide the student to explain about electrical machines.</li> <li>Practical work: Guide the student to identify the procedures for dismantling and assembling of electrical machines.</li> <li>Activity: Arrangethe students in groups to dismantle and assemble electrical machines.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret electrical diagram.</li> <li>Carry out visual and thorough inspection to locate the defective area.</li> <li>Carry out test of a circuit.</li> <li>Apply safety precautions.</li> <li>Clean the work area.</li> <li>Collect tools, equipment and other items for storage.</li> </ul>	Dismantling and assembling of electrical machines implemented according to maintenance instruction manual specification.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to dismantle and assemble electrical machines.</li> <li>Principles: The student should explain the principles related to dismantling and assembling of electrical machines.</li> <li>Theories: The student should explain: <ul> <li>The term corrective maintenance.</li> <li>The term corrective maintenance.</li> <li>The meaning of record keeping, history cards and history register.</li> </ul> </li> <li>Circumstantial knowledge Detailed knowledge Detailed knowledge about: <ul> <li>Safety and health protection gears.</li> <li>Safe handling of tools and equipment.</li> </ul> </li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: gear, and equipment should be available: • Electrical toolbox • Megger • Analogue multimeter • Digital multimeter • Insulation tester • Safety boots • Hand gloves • Safety glasses • Overalls	

Module Title					Assessment Crit	Training	Numbo	
(Main Competency )	Unit Title (Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
		(c) Replacing and repair detective parts.	<ul> <li>Brainstorm: Guide the student to define detective part.</li> <li>Practical work: Guide the student to identify the steps for rreplacing and repairing detective parts.</li> <li>Activity: Arrange the students in groups to replace and repair detective parts.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret electrical diagram.</li> <li>Carry out visual and thorough inspection to locate the defective area.</li> <li>Rectify the identified fault.</li> <li>Carry out test of the circuit.</li> <li>Apply safety precautions.</li> <li>Clean the work area.</li> <li>Collect tools, equipment and other items for storage.</li> </ul>	Defective components detected and replaced as per customers' requirement.	Knowledge evidence:Detailedknowledgeof:Methodused:Methodused:Thestudentshouldexplainhow toreplaceandrepairdetective parts.Principles:The studentshouldexplaintheprinciples:repairingdetectiveparts.Theories:The studentshould explain:••The importance ofmaintenanceschedule.CircumstantialknowledgeDetailedknowledgeabout:••Inspectionprocedures••Remedialactiongiven priority.•I.E.E regulations	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Electrical toolbox • Megger • Multimeter • Insulation tester • Safety boots • Hand gloves • Safety glasses • Overalls	

Module Title					Assessment Crit	Training	Numbo	
(Main Competency )	Unit Title (Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
	5.3 Carrying out condition- based maintenance.	(a) Preparing maintenance schedule.	<ul> <li>Brainstorm: Guide the student to define maintenance schedule.</li> <li>Practical work: Guide the student to identify the importance of preparing maintenance schedule.</li> <li>Activity: Arrange the students in groups to prepare maintenance schedule for each machine.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment and safety gear.</li> <li>Interpret electrical diagram.</li> <li>Carry out visual and thorough inspection to locate the defective area.</li> <li>Rectify the identified fault.</li> <li>Carry out test.</li> <li>Apply safety precautions.</li> <li>Clean the work place area.</li> </ul>	Maintenance schedule prepared as per instruction manual specifications	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to Prepare schedules.</li> <li>Principles: The student should explain the principles related to preparing maintenance schedules.</li> <li>Theories: The student should explain: <ul> <li>Theories: The student should explain:</li> <li>The term condition- based maintenance.</li> <li>Disadvantages and advantages of condition- based maintenance.</li> </ul> </li> <li>Circumstantial knowledge Detailed knowledge Detailed knowledge about: <ul> <li>Safe handling of working tools.</li> <li>Safe handling of measuring instruments.</li> </ul> </li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Electrical tool box</li> <li>Multimeter</li> <li>Megger</li> <li>Insulation tester</li> <li>Clamp-on meter</li> <li>Relay test set</li> <li>Safety boots</li> <li>Hand gloves</li> <li>Safety glasses</li> <li>Overalls</li> </ul>	22

Module Title					Assessment Crit	Training	Numbo	
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
		(b) Performing condition maintenance analysis.	<ul> <li>Brainstorm: Guide the student to define condition maintenance.</li> <li>Practical work: Guide the student to identify the importance of performing condition maintenance analysis.</li> <li>Activity: Arrange the students in groups to perform condition maintenance analysis.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment and safety gear.</li> <li>Interpret electrical diagram.</li> <li>Carry out visual and thorough inspection to locate the defective area.</li> <li>Rectify the identified fault.</li> <li>Carry out test.</li> <li>Apply safety precautions.</li> <li>Clean the work place area.</li> </ul>	Condition maintenance analysis performed as per manufacture's specifications.	Knowledge evidence:Detailed knowledgeof:Method used: Thestudent should explainhow to pperformcondition maintenanceanalysis.Principles: The studentshould explain theprinciples related toperforming conditionmaintenance analysis.Theories: The studentshould explain theprinciples related toperforming conditionmaintenance analysis.Theories: The studentshould explain:• The importance ofmaintenance schedule.CircumstantialknowledgeDetailed knowledgeabout:• Inspectionprocedures.• Remedial actiongiven priority.• I.E.E. regulations	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: should be available: • Electrical toolbox • Megger • Digital iinsulation tester • Safety boots • Hand gloves • Safety glasses • Overalls	

Module Title	TI *4 (T)*41				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
	5.4 Carrying out troubleshootin g.	(a) Carrying out physical check-up.	<ul> <li>Questions and answers         <ul> <li>Ask questions and guide students to answer questions on explaining how to carry out physical check-up.</li> </ul> </li> <li>ICT-based Learning:         <ul> <li>Prepare a video clip on carrying out physical check-up.</li> </ul> </li> <li>Demonstration         <ul> <li>Demonstrate the procedures for carrying out physical check-up.</li> </ul> </li> <li>Activity: Organise students in groups or a whole class to carry out physical check-up.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret electrical drawing.</li> <li>Identify tools, equipment, and required materials.</li> <li>Perform cold and hot checks.</li> <li>Locate faulty area.</li> <li>Replace and service defective components.</li> <li>Carry out tests.</li> <li>Take precautions when carrying out physical checkup.</li> <li>Collect tools, equipment and other items for storage.</li> </ul>	Physical check- up carried out as per instruction manual specifications.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge</li> <li>of:</li> <li>Method used: The student should explain how to carry out physical check-up.</li> <li>Principles: The student should explain the principles related to carrying out physical check-up.</li> <li>Theories: The student should explain:</li> <li>The importance of keeping records of faults.</li> <li>The types of faults in electrical systems.</li> <li>The necessity of maintaining reliable system.</li> <li>Circumstantial knowledge about:</li> <li>Safe and health protection gears.</li> <li>Safety precaution</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>gear, and equipment should be available:</li> <li>Electrical tool box</li> <li>Multimeter</li> <li>Megger</li> <li>Insulation tester</li> <li>Clamp-on meter</li> <li>Safety boots</li> <li>Hand gloves</li> <li>Safety goggles</li> <li>Overalls</li> </ul>	22

Module Title	II: 4 (T) 41 -				Assessment Crit	eria	Training	Numbe
(Main Competency )	(Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Suggested Resources	r of Periods per Unit
		(b) Carrying out measurement	<ul> <li>Questions and answers         <ul> <li>Ask questions and guide students to answer questions about how to carry out measurement.</li> </ul> </li> <li>ICT-based Learning:             <ul> <li>Prepare a video clip on carrying out out measurements.</li> </ul> </li> <li>Demonstration             <ul> <li>Demonstrate the procedures for carrying out measurement.</li> <li>Activity: Organise students in groups or a whole class to carry out measurement.</li> </ul> </li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret electrical diagram.</li> <li>Carry out visual and thorough inspection to locate the defective area.</li> <li>Carry out test.</li> <li>Prepare schedule for maintenance.</li> <li>Clean the work area.</li> <li>Collect tools, equipment and other items for storage.</li> </ul>	Measurement carried out as per manufacture's specifications.	Knowledge evidence:Detailed knowledgeof:Method used: Thestudent should explainhow to carrying outmeasurement.Principles: The studentshould explain theprinciples related tocarrying outmeasurement.Theories: The studentshould explain:• The importance ofcarrying outmeasurement.CircumstantialknowledgeDetailed knowledgeabout.• Inspectionprocedures• Remedial actiongiven priority• I.E.E. regulations	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Electrical toolbox • Megger • Analogue multimeter • Digital multimeter • Insulation tester • Safety boots • Hand gloves • Safety glasses • Overalls	

Module Title					Assessment Crit	eria	Training	Numbo
(Main Competency )	Unit Title (Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
		(c) Developing a trouble shooting chart.	<ul> <li>Questions and answers</li> <li>Ask question and guide students to answer questions on defining a trouble shooting chart.</li> <li>ICT-based Learning: Prepare a video clip on developing a trouble shooting chart.</li> <li>Demonstration</li> <li>Demonstrate the procedures for developing a trouble shooting chart.</li> <li>Activity: Organise students in groups or a whole class to develop a trouble shooting chart.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret electrical diagram.</li> <li>Carry out visual and thorough inspection to locate the defective area.</li> <li>Carry out test.</li> <li>Prepare schedule for maintenance.</li> <li>Clean the work area.</li> <li>Collect tools, equipment and other items for storage.</li> </ul>	Trouble shooting chart developed as per manufacture's specifications.	Knowledge evidence:Detailed knowledgeof:Method used: Thestudent should explainhow to develop atrouble shooting chart.Principles: The studentshould explain theprinciples related todeveloping a troubleshooting chart.Theories: The studentshould explain:• The iimportanceof developing a troubleshooting chart.CircumstantialknowledgeDetailed knowledgeabout:• Inspectionprocedures	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: : Electrical toolbox Megger Multimeter Insulation tester Safety boots Hand gloves Safety glasses Overall	

Module Title					eria	Training	Nameko	
(Main Competency )	Unit Title (Specific Competencies )	Elements (Learning Activities)	Suggested Teaching and Learning Methods	Process Assessment	Product/Servic e Assessment	Knowledge Assessment	Requirements/ Suggested Resources	r of Periods per Unit
		(d) Developing reference for further fault finding.	<ul> <li>Questions and answers</li> <li>Ask questions and guide students to answer on defining fault finding.</li> <li>ICT-based Learning: Prepare a video clip on developing reference for further fault finding.</li> <li>.</li> <li>Activity: Organise students in groups or a whole class to develop reference for further fault finding.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret electrical diagram.</li> <li>Carry out visual and thorough inspection to locate the defective area.</li> <li>Carry out test.</li> <li>Prepare schedule for maintenance.</li> <li>Clean the work area.</li> <li>Collect tools, equipment and other items for storage.</li> </ul>	Reference for further fault finding developed as per manufactures specifications.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge</li> <li>of:</li> <li>Method used: The student should explain how to develop reference for further fault finding.</li> <li>Principles: The student should explain the principles related to developing reference for further fault finding.</li> <li>Theories: The student should explain:</li> <li>The importance of developing reference for further fault finding.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Inspection procedures.</li> <li>Remedial action given priority.</li> <li>I.E.E. regulations</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: : Electrical toolbox Megger Multimeter Insulation tester Safety boots Hand gloves Safety glasses Overalls	

## FORM FOUR

## Table 5: Detailed Contents for Form Four

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
1.0 Performing illumination tasks.	1.1 Performing light-level assessment	(a) Design lighting schemes	<ul> <li>Brains Guide explore method designi system:</li> <li>Think- share Guide to procedu designi scheme</li> <li>Interne Librar Guide search informa the lighting</li> </ul>	torm: students to the s of ng lighting s. ink-pair the students identify ares for ng lighting s. et and y Search students to for relevant ation about design of g schemes.	The student should be able to: • Select tools, equipment, and safety gear. • Interpret electrical drawing. • Erect lighting structures. • Erect specialised light fitting. • Connect supply. • Commis sion light system • Observe safety precautions. • Clean workplace.	Design of lighting schemes performed as per technical specifications and IEE regulations.	Knowledge evidence: Detailed knowledge of: Method used: The student should be able to design lighting schemes. Principles: The student should explain the principles relating to designing lighting schemes. Theories: The student should describe: • Sources of light. • Glare. Circumstantial knowledge: Detailed knowledge about: • Safety precautions, testing procedures, and I.E.E. regulations. • Maintenance of lighting system	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: : • Electrician 's tool kit • Multimeter • Lux meter • Lux/foot candles light meter • LED light meter • Data logging light meter • Safety boots • Safety gloves • Safety helmet	23
							or ingitting by storin		

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	Training	Number	
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
		(b) Maintaining lighting system.	<ul> <li>Brains</li> <li>Guide explore maintai lighting</li> <li>Think- share</li> <li>Guide to id procede maintai lighting</li> <li>Interne Librar</li> <li>Guide s search informa maintai lighting</li> </ul>	torm: students to ways of ining a gsystem. ink-pair the students entify the ures for ining gsystem. et and y Search students to for relevant ation about ining the g system.	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and safety gear.</li> <li>Interpret electrical drawing.</li> <li>Erect lighting structures.</li> <li>Erect specialised light fitting.</li> <li>Connect supply.</li> <li>Commis sion light system.</li> <li>Observe safety precautions.</li> <li>Clean workplace.</li> </ul>	Maintaining lighting systems performed as per technical specifications and IEE regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should describe how to maintain a lighting system.</li> <li>Principles: The student should explain the principles related to maintaining the lighting system.</li> <li>Theories: The student should explain:</li> <li>Sources of light.</li> <li>Glare.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions, testing procedures, and I.E.E. regulations.</li> <li>Maintenance of the lighting system.</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>should be available:</li> <li>Electrician's tool kit</li> <li>Multimeter</li> <li>Lux meter</li> <li>Lux/foot candles light meter</li> <li>LED light meter</li> <li>Data logging light meter</li> <li>Safety boots</li> <li>Safety gloves</li> <li>Safety helmet</li> </ul>	
	1.2 Installing special	(a) Installing direct Lighting.	• Brains Guide identify	torm: students to the uses	The trainee should be able to:	A specialised direct lighting installed per technical	Knowledge evidence: Detailed knowledge	This unit can be achieved at the workplace or	50

Module Title	Unit Title	Elements	Suggested         Teaching         Assessment Criteria				Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
	lighting system.		<ul> <li>of direct lighting.</li> <li>Think-ink-pair share Guide the students to identify types of direct lighting schemes.</li> <li>Internet and Library Search Guide students to search for relevant information about the direct lighting.</li> <li>Activity: Arrange the students in groups to mmaintain the lighting system.</li> </ul>	<ul> <li>Select tools, equipment, and safety gear.</li> <li>Interpret electrical drawing.</li> <li>Erect lighting structures</li> <li>Erect specialized light fitting</li> <li>Connect supply.</li> <li>Commis sion light system</li> <li>Observe safety precautions.</li> <li>Clean workplace</li> </ul>	specifications and IEE regulations.	<ul> <li>of: Method used: The student should</li> <li>explain how to install direct lighting.</li> <li>Principles: The student should</li> <li>explain principles related to installing direct lighting.</li> <li>Theories: The student should</li> <li>explain:</li> <li>The proper lighting for a given job.</li> <li>Effects of poor illumination.</li> <li>The different types of light sources.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge</li> <li>about:</li> <li>Safety precautions, testing procedures, and I.E.E. regulations.</li> </ul>	<ul> <li>training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>r, and equipment should be available:</li> <li>Electrician's tool kit</li> <li>Hammer</li> <li>Specialised light fittings</li> <li>Multimeter</li> <li>Lux meter</li> <li>Light meter</li> <li>Lux/foot candles light meter</li> <li>LED light meter</li> <li>Data logging light meter</li> <li>Safety boots</li> <li>Safety helmet</li> </ul>	
		(b) Installing semi-direct lighting.	• Brainstorm: Guide students to explore the method of semi-direct	The student should be able to: • Select	A semi-direct lighting system was installed per technical specifications and	Knowledge evidence: Detailed knowledge of:	This unit can be achieved at the workplace or training institution.	

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
			<ul> <li>lighting.</li> <li>Think-ink-pair share Guide the students to identify types of semi-direct lighting.</li> <li>Internet and Library Search Guide students to search for relevant information about installing semi- direct lighting.</li> </ul>	<ul> <li>tools,</li> <li>equipment,</li> <li>and safety</li> <li>gear.</li> <li>Interpret</li> <li>electrical</li> <li>drawing.</li> <li>Erect</li> <li>lighting</li> <li>structures.</li> <li>Erect</li> <li>specialised</li> <li>light fitting.</li> <li>Connect</li> <li>supply.</li> <li>Commis</li> <li>sion light</li> <li>system.</li> <li>Observe</li> <li>safety</li> <li>precautions.</li> <li>Clean</li> <li>workplace.</li> </ul>	IEE regulations.	Method used: The student should explain how to install direct lighting. Principles: The student should explain principles related to installing direct lighting. Theories: The student should know the importance of: • Proper lighting for a given job. • Effects of poor illumination. • Different types of light sources. Circumstantial knowledge Detailed knowledge about: • Safety precautions, testing procedures, and I.E.E. regulations.	<ul> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Electrician's tool kit</li> <li>Hammer</li> <li>Specialszed light fittings</li> <li>Multimeter</li> <li>Lux meter</li> <li>Light meter</li> <li>Lux/foot candles light meter</li> <li>LED light meter</li> <li>Data logging light meter</li> <li>Safety boots</li> <li>Safety helmet</li> </ul>	
		(c) Installing indirect lighting.	<ul> <li>Brainstorm: Guide students to explore the uses of indirect lighting.</li> <li>Think-ink-pair share</li> </ul>	<ul> <li>The should</li> <li>be able to:</li> <li>Select</li> <li>tools,</li> <li>equipment,</li> <li>and safety</li> </ul>	An indirect lighting system was installed per technical specifications and IEE regulations.	Knowledge evidence: Detailed knowledge of: Method used: The student should	This unit can be achieved at the workplace or training institution. The following tools, safety gear,	

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
			<ul> <li>Guide the students to identify types of indirect lighting.</li> <li>Internet and Library Search</li> <li>Guide students to search for relevant information about installing indirect lighting.</li> </ul>	<ul> <li>gear.</li> <li>Interpret electrical drawing.</li> <li>Erect lighting structures.</li> <li>Erect specialised light fitting.</li> <li>Connect supply.</li> <li>Commis sion light system.</li> <li>Observe safety precautions.</li> <li>Clean workplace.</li> </ul>		<ul> <li>explain how to install indirect lighting.</li> <li>Principles: The student should</li> <li>explain principles related to installing indirect lighting.</li> <li>Theories: The student should know the importance of:</li> <li>Proper lighting for a given job.</li> <li>Effects of poor illumination.</li> <li>Different types of light sources.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions, testing procedures, and I.E.E. regulations.</li> </ul>	<ul> <li>and equipment are to be available:</li> <li>Electrician's tool kit</li> <li>Hammer</li> <li>Specialised light fittings</li> <li>Multimeter</li> <li>Lux meter</li> <li>Light meter</li> <li>Lux/foot candles light meter</li> <li>LED light meter</li> <li>Data logging light meter</li> <li>Safety boots</li> <li>Safety helmet</li> </ul>	
		(d) Installing outdoor lighting	<ul> <li>Brainstorm: Guide students to explore the uses of outdoor lighting.</li> <li>Think-ink-pair share Guide the students to identify types of outdoor lighting.</li> </ul>	<ul> <li>The trainee should be able to:</li> <li>Select tools, equipment, and safety gear.</li> <li>Interpret</li> </ul>	An outdoor lighting system was installed per technical specifications and IEE regulations.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to install outdoor lighting. Principles: The	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:	
Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
-----------------------	--------------------------------	---	--	--	---	--	--	------------------------
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
			Internet and Library Search Guide students to search for relevant information about installing outdoor lighting.	<ul> <li>electrical drawing.</li> <li>Erect lighting structures.</li> <li>Erect specialised light fitting.</li> <li>Connect supply.</li> <li>Commis sion light system.</li> <li>Observe safety precautions.</li> <li>Clean workplace.</li> </ul>		<ul> <li>student should</li> <li>explain principles</li> <li>related to installing</li> <li>direct lighting.</li> <li><b>Theories:</b> The</li> <li>student should know</li> <li>the importance of: <ul> <li>Proper lighting for</li> <li>a given job.</li> </ul> </li> <li>Effects of poor</li> <li>illumination.</li> <li>Different types of</li> <li>light sources.</li> <li>Circumstantial</li> <li>knowledge</li> <li>Detailed knowledge</li> <li>about: <ul> <li>Safety</li> <li>precautions, testing</li> <li>procedures, and</li> <li>I.E.E. regulations.</li> </ul> </li> </ul>	<ul> <li>Electrician's tool kit</li> <li>Hammer</li> <li>Specialised light fittings</li> <li>Multimeter</li> <li>Lux meter</li> <li>Light meter</li> <li>Lux/foot candles light meter</li> <li>LED light meter</li> <li>Data logging light meter</li> <li>Safety boots</li> <li>Safety helmet</li> </ul>	
		(e) Installing pprojected lighting.	<ul> <li>Brainstorm: Guide students to explore the uses of projected lighting.</li> <li>Think-ink-pair share Guide the students to identify procedures for installing projected lighting.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and safety gear.</li> <li>Interpret electrical drawing.</li> </ul>	A projected lighting system was installed per technical specifications and IEE regulations.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to install projected lighting. Principles: The student should explain principles	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Electrician's tool kit</li> </ul>	

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
			• Internet and Library Search Guide students to search for relevant information about installing projected lighting.	<ul> <li>Erect lighting structures.</li> <li>Erect specialised light fitting.</li> <li>Connect supply.</li> <li>Commis sion light system.</li> <li>Observe safety precautions.</li> <li>Clean workplace.</li> </ul>		<ul> <li>related to installing projected lighting.</li> <li>Theories: The student should explain the importance of:</li> <li>Proper lighting for a given job.</li> <li>Effects of poor illumination.</li> <li>Different types of light sources.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge</li> <li>about: <ul> <li>Safety</li> <li>precautions, testing</li> <li>procedures, and</li> <li>I.E.E. regulations.</li> </ul> </li> </ul>	<ul> <li>Hammer</li> <li>Specialised light fittings</li> <li>Multimeter</li> <li>Lux meter</li> <li>Light meter</li> <li>Lux/foot candles light meter</li> <li>LED light meter</li> <li>Data logging light meter</li> <li>Safety boots</li> <li>Safety gloves</li> <li>Safety helmet</li> </ul>	
		(f) Performing temporary installation	<ul> <li>Brainstorm: Guide students to explore the uses of temporary installation.</li> <li>Think-ink-pair share Guide the students to identify the procedures for installing temporary lighting.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and safety gear.</li> <li>Interpret electrical drawing.</li> <li>Erect</li> </ul>	A temporary lighting system was installed per technical specifications.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to perform the temporary installation. Principles: The student should	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Electrician's tool kit</li> </ul>	

Module Title	Unit Title	Elements	Suggested Teaching	ria	Training	Number		
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
			• Internet and Library Search Guide students to search for relevant information about performing temporary installation of lighting scheme.	<ul> <li>lighting structures.</li> <li>Erect specialised light fitting.</li> <li>Connect supply.</li> <li>Commis sion light system.</li> <li>Observe safety precautions.</li> <li>Clean workplace.</li> </ul>		<ul> <li>explain principles</li> <li>related to performing</li> <li>temporary</li> <li>installation.</li> <li><b>Theories:</b> The</li> <li>student should</li> <li>explain the</li> <li>importance of:</li> <li>Proper lighting for</li> <li>a given job.</li> <li>Effects of poor</li> <li>illumination.</li> <li>Different types of</li> <li>light sources.</li> <li><b>Circumstantial</b></li> <li><b>knowledge</b></li> <li><b>Detailed knowledge</b></li> <li><b>about:</b></li> <li>Safety</li> <li>precautions, testing</li> <li>procedures, and</li> <li>I.E.E. regulations.</li> </ul>	<ul> <li>Hammer</li> <li>Specialised light fittings</li> <li>Multimeter</li> <li>Lux meter</li> <li>Light meter</li> <li>Lux/foot candles light meter</li> <li>LED light meter</li> <li>Data logging light meter</li> <li>Safety boots</li> <li>Safety gloves</li> <li>Safety helmet</li> </ul>	
2.0 Installing electrical machines.	2.1 Installing AC machines.	(a) Installing transformers.	<ul> <li>Brainstorm: Guide the student to define the term transformer.</li> <li>Practical work: Guide the student to identify the importance of transformers.</li> <li>Activity: Arrange the students in</li> </ul>	The student should be able to: • Interpret the drawing. • Draw an electrical wiring diagram. • Identify tools,	<ul> <li>AC machine placed on its bed safely and supply conductors bunched neatly.</li> <li>Connectionwas made as per manufacturer's manual.</li> <li>A.C. machine operates as per</li> </ul>	Knowledgeevidence:Detailed knowledgeof:Method used: Thestudentshouldexplain how to installtransformers.•Principles:The student shouldexplain the principles	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Rawl plugs	45

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Criter	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
<b>Competency</b> )	Competen	Activities)	Methods	-	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	-
			groups transfor	to install mers.	equipment, and required materials. • Fix and align AC machines on its bed. • Make a visual inspection of broken dial faces on the machines. • Make earth continuity and insulation tests between phase and earth, and between phase and phase. • Identify phase marking. • Install the AC	manual instructions.	of installing transformers. • Theories: The student should explain: • The application of a single and three- phase transformers. • Circumstan tial knowledge • Detailed knowledge about: • Safety precautions, testing procedures, and I.E.E. regulations. • Hazards classification and control. • Maintenance of machines.	<ul> <li>A set of screwdrivers</li> <li>A set of spanners</li> <li>Ball peen hammer</li> <li>Cross peen hammer</li> <li>Cross peen hammer</li> <li>Megger</li> <li>Combination pliers</li> <li>Diagonal cutting pliers</li> <li>Electrician knife</li> <li>Safety goggles</li> <li>Overalls</li> <li>Safety boots</li> <li>Installation tester</li> <li>Multimeter</li> <li>Clamp on meter</li> <li>Gloves</li> </ul>	
					• Carry				

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
				<ul> <li>out testing of AC machine.</li> <li>Apply safety precautions.</li> <li>Clean the work area.</li> </ul>				
		(b) Installing induction motors.	<ul> <li>Brainstorm: Guide the student to define induction motor.</li> <li>Practical work: Guide the student to identify types of induction motors.</li> <li>Activity: Arrange the students in groups to install induction motors.</li> </ul>		<ul> <li>AC machine placed on its bed safely and supply conductors bunched neatly.</li> <li>Connections made as per manufacturer's manual.</li> <li>A.C. machine operates as per manual instructions.</li> </ul>	Knowledge evidence: Detailed knowledge of: The method used: The student should explain how to install the induction motor. Principles: The student should explain the principles of installing induction motors. Theories: The student should explain: • About the application of induction motors. Circumstantial knowledge Detailed knowledge about:		

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number	
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit	
						• Safety precautions, testing procedures, and I.E.E. regulations.			
		(c) Installing synchronous motors.	<ul> <li>Brainstorm: Guide the student to define synchronous motors.</li> <li>Practical work: Guide the student to identify types of synchronous motors.</li> <li>Activity: Arrange the students in groups to install synchronous motors.</li> </ul>	<ul> <li>Ine student</li> <li>should be</li> <li>able to: <ul> <li>Interpret</li> <li>the</li> <li>drawing</li> <li>Identify</li> <li>tools,</li> <li>equipme</li> <li>nt and</li> <li>required</li> <li>material</li> <li>s.</li> </ul> </li> <li>Fix and align</li> <li>AC</li> <li>machine</li> <li>s on its</li> <li>bed.</li> <li>Make</li> <li>visual</li> <li>inspecti</li> <li>on of</li> <li>broken</li> <li>dial</li> </ul>	A synchronous motor placed on its bed safely and supply conductors bunched neatly. Connections are made as per manufacturer's manual. A.C. machine operates as per manual instructions.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The should explain how to install ssynchronous motors.</li> <li>Principles: The student should explain the principles of installing synchronous motors.</li> <li>Theories: The student should explain:</li> <li>Application of synchronous motors.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions, testing procedures, and I.E.E. regulations.</li> </ul>	<ul> <li>achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Rawl plugs</li> <li>A set of screw drivers</li> <li>A set of spanners</li> <li>Ball peen hammer</li> <li>Cross peen hammer</li> <li>Megger</li> <li>Combination pliers</li> <li>Diagonal cutting pliers</li> <li>Electrician's knife</li> <li>Safety goggles</li> </ul>		

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods	8	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)				110000000000000000000000000000000000000			Resources	P
	cies)							<b>Resources</b>	
	cies)	Activities)			<ul> <li>Assessment</li> <li>faces on the machine s.</li> <li>Make earth continui ty test and insulatio n test between phase and earth and between phase.</li> <li>Identify phase marking .</li> <li>Carry out testing of AC</li> </ul>	Assessment	<ul> <li>Assessment</li> <li>Hazards classification and control</li> <li>Maintenance of machines</li> </ul>	<ul> <li>Suggested Resources</li> <li>Overalls</li> <li>Safety boots</li> <li>Installation tester</li> <li>Multimeter</li> <li>Clamp on meter</li> <li>Gloves</li> </ul>	
					of AC machine • Apply safety				

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
				precauti ons. • Clean the work area.				
		(d) Installing generators.	<ul> <li>Brainstorm: Guide the student to define generator.</li> <li>Practical work: Guide the student to identify types of generators. Activity: Arrange the students in groups to install generators.</li> </ul>	<ul> <li>The trainee should be able to:</li> <li>Interpret the drawing.</li> <li>Identify tools, equipment, and required materials.</li> <li>Fix and align AC machines on its bed.</li> <li>Make a visual inspection of broken dial faces on the machines.</li> </ul>	<ul> <li>AC machine placed on its bed safely and supply conductors bunched neatly.</li> <li>Connections made as per manufacturer's manual.</li> <li>A.C. machine operates as per manual instructions.</li> </ul>	Knowledge evidence:Detailed knowledge of:Method used: The student should explain how to install generators.Principles: The student should explain the principles of installing generators.Theories: The student should explain:• The application of single and three- phase transformers.Circumstantial	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Rawl plugs</li> <li>A set of screwdrivers</li> <li>A set of spanners</li> <li>Ball peen hammer</li> <li>Cross peen hammer</li> <li>Megger</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	<b>Product/Service</b>	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
					<ul> <li>Make earth continuity and insulation tests</li> <li>between phase and earth, and between phase and phase.</li> <li>Identify phase marking.</li> <li>Install the AC machine.</li> <li>Carry out testing of AC machine</li> </ul>		<ul> <li>knowledge</li> <li>Detailed knowledge</li> <li>about: <ul> <li>Safety</li> <li>precautions, testing</li> <li>procedures, and</li> <li>I.E.E. regulations.</li> <li>Hazards</li> <li>classification and</li> <li>control.</li> </ul> </li> <li>Maintenance of machines.</li> </ul>	<ul> <li>Combination pliers</li> <li>Diagonal cutting pliers</li> <li>Electrician's knife</li> <li>Safety goggles</li> <li>Overalls</li> <li>Safety boots</li> <li>Installation tester</li> <li>Multimeter</li> <li>Clamp on meter</li> <li>Gloves</li> </ul>	
					<ul> <li>Apply safety precautions.</li> <li>Clean the work area.</li> </ul>				
	2.2 Installing control of AC	(a) Installing DOL starter incorporatin g remote	Brainst     Guide tl     to define     starter.	orm: he student e DOL	The student should be able to:	The installed machine controls and functions as per standards.	Knowledge evidence: Detailed knowledge	This unit can be achieved at the workplace or training institution.	74

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested	of Periods per Unit
	machines.	control.	<ul> <li>Practical work: Guide the student to state the importance of DOL starter.</li> <li>Activity: Arrange</li> </ul>	<ul> <li>Interpret the control diagram.</li> <li>Identify</li> </ul>		of: Method used: The student should explain how to install	Resources The following tools, safety gear, and equipment are to be available:	
			the students in groups to install over-voltage and under-voltage protective device.	the types and ratings of machine control. • Mark the location for installing the machine control systems. • Install the machine control. • Termina te cables. • Test the machine control.		<ul> <li>a DOL starter</li> <li>incorporating remote</li> <li>control.</li> <li><b>Principles:</b> The</li> <li>student should</li> <li>explain the principles</li> <li>related to installing a</li> <li>DOL starter</li> <li>incorporating remote</li> <li>control.</li> <li><b>Theories:</b> The</li> <li>student should</li> <li>explain:</li> <li>The types of</li> <li>machine control.</li> <li>The major parts</li> <li>of machine</li> <li>control.</li> </ul>	<ul> <li>Set of screw drivers</li> <li>Multimeter</li> <li>Set of spanners</li> <li>Workbench</li> <li>Safety boots</li> <li>Safety goggle.</li> <li>Leather and plastic gloves</li> <li>Overalls</li> <li>Combination pliers</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>Apply safety precautions.</li> <li>Clean the workplace.</li> </ul>		<ul> <li>The power rating of machine control.</li> <li>The application and importance of machine control.</li> <li>Circumstantial knowledge Detailed knowledge about:         <ul> <li>Safe handling of machine controls.</li> <li>Maintenance of machines and equipment.</li> </ul> </li> </ul>		
		(b) Installing DOL by using the jogging method.	<ul> <li>Brainst Guide th to definusing th method.</li> <li>Practic Guide th to state importa</li> </ul>	orm: he student e DOL by e jogging al work: he student the nce of	The student should be able to: • Interpret the control	The installed machine control and functions as per standards.	Knowledge evidence: Detailed knowledge of: Method used: The student should	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	Training	Number	
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
			<ul> <li>DOL by jogging</li> <li>Activity the stud groups to over-vounder-vounder-vour</li></ul>	v using the method. y: Arrange ents in to install ltage and oltage ve devices.	diagram Identify types and ratings of machine control. Mark the location for installin g the machine control systems. Install the machine		<ul> <li>explain how to install</li> <li>a DOL starter by</li> <li>using the jogging</li> <li>method.</li> <li>Principles: The</li> <li>student should</li> <li>explain the principles</li> <li>related to installing a</li> <li>DOL by using</li> <li>jogging methods.</li> <li>Theories: The</li> <li>student should</li> <li>explain:</li> <li>The types of</li> <li>machine control.</li> <li>The major parts</li> <li>of machine</li> <li>control.</li> <li>The power rating</li> <li>of machine</li> <li>control.</li> <li>The application</li> </ul>	<ul> <li>Set of screwdrivers</li> <li>Multimeter</li> <li>Set of spanners</li> <li>Workbench</li> <li>Safety boots</li> <li>Safety goggles</li> <li>Leather and plastic gloves</li> <li>Overalls</li> <li>Combination pliers</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>Termina te cables.</li> <li>Test the machine control.</li> <li>Apply safety precauti ons.</li> <li>Clean the workpla ce.</li> </ul>		and importance of machine control. <b>Circumstantial</b> <b>knowledge</b> <b>Detailed knowledge</b> <b>about:</b> • Safe handling of machine controls.		
		(c) Installing forward and reverse starter.	<ul> <li>Brainst Guide ti to defin and reve</li> <li>Practic Guide ti to state importa forward reverse</li> <li>Activity</li> </ul>	torm: he student e fforward erse starter. al work: he student the nce of l and starter. y: Arrange	The student should be able to: • Interpret the control diagram	The installed fforward and reverse starter operating well.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to install	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are	

(Main Competency)(Learning Activities)and MethodsLearning MethodsProcess AssessmentProduct/Service AssessmentKnowledge AssessmentRequirements/ Suggested Resourcesof Per per Un Resources<	Module Title	Unit Title	Elements	Suggested Teaching			Assessment Crite	ria	Training	Number
the students in groups to install forward and reverse starter.       .       forward and reverse starter.       to be available be available:         • Identify reverse starter.       .       • Identify types       Principles: The student should       • Set of screw drivers         and ratings       and ratings       explain the principles       • Multimeter         of machine control.       .       • Set of spanners         Mark       Theories: The starter.       • Safety goggles	(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
the       student should       • Leather and         location       for       • The types of       • Overalls         installin       machine       of machine       • Combination         g the       • The major parts       • Combination         machine       of machine       • Overalls         control       gste       • The major parts         machine       of machine       • Overalls         control       systems.       • The power rating         • Install       of machine       • Install         the       control.       systems.         • Install       of machine       • The application         machine       control.       and importance         • Tremina       of machine       • The application				the stud groups forward reverse	lents in to install l and starter.	<ul> <li>Identify types and ratings of machine control.</li> <li>Mark the location for installin g the machine control systems.</li> <li>Install the machine control.</li> </ul>		forward and reverse starter. <b>Principles:</b> The student should explain the principles related to installing a forward and reverse starter. <b>Theories:</b> The student should explain: • The types of machine control. • The major parts of machine control. • The power rating of machine control. • The application and importance of machine	<ul> <li>to be available be available:</li> <li>Set of screw drivers</li> <li>Multimeter</li> <li>Set of spanners</li> <li>Workbench</li> <li>Safety boots</li> <li>Safety goggles</li> <li>Leather and plastic gloves</li> <li>Overalls</li> <li>Combination pliers</li> </ul>	

Module Title	Unit Title	Elements	Suggested Teach	ing		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and Learn	ing	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
					te		control.		
					cables.		Circumstantial		
					• Test the		knowledge		
					machine		Detailed knowledge		
					control.		about:		
					• Apply		• Safe handling of		
					safety		machine		
					precauti		controls.		
					ons.				
					• Clean				
					the				
					workpla				
					ce.				
					Store tools,				
					equipment,				
					and safety				
		(d) Installing	Brainstorn	n: /	The student	The installed manual	Knowledge	This unit can be	
		manual star-	Guide the student to		should be	star- delta starter	evidence:	achieved at the	
			delta starter.		able to:	standards.	Detailed knowledge	workplace or	
			Practical work     Guide the stude	:	• Interpret		of:	training institution.	
			to state the	III.	the		Method used: The	The following	
			importance of a	to	control		student should	tools, safety gear,	
			starter.	ia					

Module Title	Unit Title	Elements	Suggested Teaching			Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested	of Periods per Unit
	cies)							Resources	
Competency )	Competen cies)	Activities)	<ul> <li>Activity Arrange students to instal star- del</li> </ul>	y: ethe s in groups l manual Ita starter.	Assessment diagram Identify types and ratings of machine control. Mark the location for installin g the machine control systems.	Assessment	Assessment explain how to install manual star- delta starter. Principles: The student should explain the principles related to installing manual star -delta starter. Theories: The student should explain: • The types of machine control. • The major parts of machine control. • The power rating of machine	Suggested Resources and equipment are to be available • Set of screw drivers • Multimeter • Set of spanners • Workbench • Safety boots • Safety goggles • Leather and plastic gloves • Overalls • Combination pliers	per Unit
					• Install the		of machine control.		
					machine		• The application		
					control.		and importance		

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>Termina te cables.</li> <li>Test the machine control.</li> <li>Apply safety precauti ons.</li> <li>Clean the workpla ce.</li> </ul>		of machine control. Circumstantial knowledge Detailed knowledge about: • Safe handling of machine controls.		
		(e) Installing automatic star-delta starter.	<ul> <li>Brainsternet Guide the to define automatic delta sta</li> <li>Practica Guide the to state the important automatic delta sta</li> </ul>	orm: the student the the tic star- rter. al work: the student the the student the the star- rter. the student the student	The student should be able to: • Interpret the control diagram	The installed automatic star-delta starter functions as per standards.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to install	• This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available	

Module Title	Unit Title	Elements	Suggested	Teaching			Assessment Criter	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Pro Ass	ecess ressment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
			Activity the stud groups automa delta sta	y: Arrange lents in to install an tic star- arter.	•	· Identify types and ratings of machine control. Mark the location for installin g the machine control systems. Install the machine control.		the automatic star- delta starter. <b>Principles:</b> The student should explain the principles related to iinstalling an automatic star- delta starter. <b>Theories:</b> The student should explain: • The types of machine control. • The major parts of machine control. • The power rating of machine control. • The application and importance of machine		

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	Training	Number	
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					te cables. • Test the machine control. • Apply safety precauti ons. • Clean the workpla ce.		control. Circumstantial knowledge Detailed knowledge about: • Safe handling of machine controls.		
		(f) Installing a rotor resistance starter for the ship-ring motor with automatic starting.	<ul> <li>Brainst Guide tl to defin- resistan- for the s motor w automat</li> <li>Practic Guide tl to state importa rotor res starter f</li> </ul>	orm: he student e a rotor ce starter ship-ring vith ic starting. al work: he student the nce of a sistance or the ship-	The student should be able to: • Interpret the control diagram · • Identify types and ratings of	The installed a rotor resistance starter for ship-ring motor with automatic starting machine controls and functions as per standards.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to install a rotor resistance starter for ship-ring motor with automatic starting. Principles: The student should	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Set of screw drivers.</li> <li>Multimeter</li> <li>Set of spanners</li> <li>Workbench</li> </ul>	

Module Title	Unit Title	Elements	Suggested Teaching			Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
			ring moto automatic • Activity: the studen groups to rotor resi starter for ring moto automatic	or with c starting. Arrange nts in o install a stance r the ship- or with c starting.	<ul> <li>machine control.</li> <li>Mark the location for installin g the machine control systems.</li> <li>Install the machine control.</li> <li>Termina te cables.</li> <li>Test the machine control.</li> <li>Test the machine control.</li> <li>Clean the workpla ce.</li> </ul>		<ul> <li>explain the principles related to installing a rotor resistance</li> <li>starter for a ship-ring motor with automatic starting.</li> <li><b>Theories:</b> The student should explain:</li> <li>The types of machine control.</li> <li>The major parts of machine control.</li> <li>The power rating of machine control.</li> <li>The application and importance of machine control.</li> <li><b>Circumstantial</b> knowledge Detailed knowledge about:</li> <li>Safe handling of machine controls.</li> </ul>	<ul> <li>Safety boots</li> <li>Safety goggles</li> <li>Leather and plastic gloves</li> <li>Overalls</li> <li>Combination pliers</li> </ul>	
		(g) Installing a rotor	Brainsto     Guide the	e student	The student should be	The installed automatic starter-	Knowledge evidence:	This unit can be achieved at the	
		resistance	to define	a rotor	able to:	resistor/capacitor/ind	Detailed knowledge	workplace or	
		resistance	to define	a rotor	able to:	resistor/capacitor/ind	Detailed knowledge	workplace or	

Module Title	Unit Title	Elements	Suggested Teaching		g Assessment Criteria				Training	Number
(Main	(Specific	(Learning	and	Learning	Pro	ocess	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods		Ass	sessment	Assessment	Assessment	Suggested	per Unit
	cies)								Resources	
		startar for	registere	o stortor		Tarta ana ant	uctor storter functions	of	training institution	
		starter for the ship-ring motor with automatic starting.	resistance for the sl motor w automati • <b>Practica</b> Guide th to state t importar rotor res starter for ring mot automati • <b>Activity</b> the stude groups to rotor res starter for ring mot automati	e starter hip-ring ith ic starting. <b>I work:</b> e student he ice of a istance or the ship- or with ic starting. <b>:</b> Arrange ents in o install a istance or the ship- or with ic starting.	•	Interpret the control diagram Identify types and ratings of machine control. Mark the location for installin g the machine control systems. Install the machine control. Termina te cables. Test the machine control. Apply	uctor starter functions as per standards.	<ul> <li>of: Method used: The student should</li> <li>explain how to install an automatic starter- resistor/capacitor/ind uctor starter.</li> <li>Principles: The student should</li> <li>explain the principles related to installing an automatic starter- resistor/capacitor/ind uctor starter.</li> <li>Theories: The student should</li> <li>explain:</li> <li>The types of machine control.</li> <li>The major parts of machine control.</li> <li>The power rating of machine control.</li> <li>The application and importance of machine control.</li> <li>Circumstantial knowledge Detailed knowledge</li> </ul>	<ul> <li>training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Set of screw drivers</li> <li>Multimeter</li> <li>Set of spanners</li> <li>Workbench</li> <li>Safety boots</li> <li>Safety goggles</li> <li>Leather and plastic gloves</li> <li>Overalls</li> <li>Combination pliers</li> </ul>	
						safety		about:		

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
				<ul> <li>precauti ons.</li> <li>Clean the workpla ce.</li> </ul>		Safe handling of machine controls.		
	2.3 Installing D.C. machines.	(a) Installing D.C. generators.	<ul> <li>Brainstorm: Guide the student to define over- voltage D.C. generators.</li> <li>Practical work: Guide the student to identify types of DC generators.</li> <li>Activity: Arrange the students in groups to install D.C. generators.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret the drawing <ul> <li>Identify tools, equipme nt, and the required material</li> <li>Prepare the bed of the D.C. machine</li> <li>Fix and align the D.C. machine s on its</li> </ul> </li> </ul>	D.C motors were fixed on its bed and cables were terminated as per manual instructions.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to install</li> <li>D.C. generators.</li> <li>Principles: The student should explain the principles relating to installing</li> <li>D.C. generators.</li> <li>Theories: The student should explain:</li> <li>The three basic types of D.C. machines.</li> <li>The commutation process.</li> <li>Speed regulation applied to D.C. machines.</li> <li>The armature</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Rawl plugs</li> <li>A set of screwdrivers</li> <li>A set of spanners</li> <li>Megger</li> <li>Combination pliers</li> <li>Electrician's knife</li> <li>Clamp on meter</li> <li>Multimeter</li> <li>Insulation tester</li> <li>Safety goggles</li> <li>Safety goggles</li> <li>Safety boots</li> <li>Leather and</li> </ul>	18

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	Training	Number	
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
<b>Competency</b> )	Competen	Activities)	Methods	8	Assessment	Assessment	Assessment	Suggested	per Unit
r r s s s	cies)	,			1 100 000 110 110	120000000000000000000000000000000000000	120000000000000000000000000000000000000	Resources	1
	)								
					bed.		reaction in D.C.	plastic gloves	
					<ul> <li>Make a</li> </ul>		machines	<ul> <li>Overalls</li> </ul>	
					visual		Application of	- Overalls	
					inspecti		different types of		
					on of		DC machines		
					brokan		Circumstantial		
					dial		Imorriedge		
					faces on		Nilowieuge Deteiled knowledge		
					the		a hant		
					maahina		about		
					machine		• Safety		
					S.		precautions on		
					• Make		maintaining the		
					earth		speed of D.C.		
					continui		machines.		
					ty test				
					and				
					insulatio				
					n test				
					between				
					positive				
					and				
					earth,				
					and				
					between				
					positive				
					and				
					negative				
					poles.				
					• Identify				
					positive				
					and				
					negative				
					marking				

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>also field and armatur e winding .</li> <li>Install and terminat e cable of the D.C. machine .</li> <li>Carry out test of D.C. machine</li> <li>Clean the work</li> </ul>				
		(b) Installing D.C. motors.	<ul> <li>Brainst Guide tl to define motors.</li> <li>Practice Guide tl to idente Types o motors.</li> </ul>	orm: he student e D.C. al work: he student ify the f D.C.	The student should be able to: • Interpret the drawing • Identify tools,	D.C. motors were fixed on its bed and cables terminated as per manual instructions.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to install D.C. motors. Principles: The	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Rawl plugs	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
<b>Competency</b> )	Competen	Activities)	Methods	U	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	-
	, , , , , , , , , , , , , , , , , , ,								
			Activity: the studen groups to D.C. mote	Arrange nts in o install ors.	<ul> <li>equipme nt, and the required material</li> <li>.</li> <li>Prepare the bed of the D.C. machine</li> <li>.</li> <li>Fix and align the D.C. machine s on its bed.</li> <li>Make a visual inspecti on of broken dial faces on the machine s.</li> <li>Make earth continui ty test and</li> </ul>		<ul> <li>student should explain the principles relating to installing D.C. motors.</li> <li>Theories: The student should explain:</li> <li>The three basic types of D.C. machines.</li> <li>The commutation process.</li> <li>Speed regulation applied to D.C. machines.</li> <li>The armature reaction in D.C. machines.</li> <li>The armature reaction of different types of D.C. machines.</li> <li>Application of different types of D.C. machines.</li> <li>Circumstantial knowledge Detailed knowledge about:</li> <li>Safety precautions on maintaining the speed of D.C. machines.</li> </ul>	<ul> <li>A set of screwdrivers</li> <li>A set of spanners</li> <li>Megger</li> <li>Combination pliers</li> <li>Electrician's knife</li> <li>Clamp on meter</li> <li>Multimeter</li> <li>Insulation tester</li> <li>Safety goggles</li> <li>Safety boots</li> <li>Leather and plastic gloves</li> <li>Overalls</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	Requirements/	of Periods
<b>Competency</b> )	Competen	Activities)	Methods	C	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)	, , , , , , , , , , , , , , , , , , ,						Resources	-
	,								
					insulatio				
					n test				
					between				
					positive				
					and				
					earth.				
					and				
					between				
					positive				
					and				
					negative				
					noles				
					<ul> <li>Identify</li> </ul>				
					and				
					negative				
					marking				
					also				
					field				
					and				
					anu				
					armatur				
					U winding				
					winding				
					• • Install				
					• Install				
					and				
					terminat				
					e the				
					cable of				
					the D.C.				
					machine				
					<ul> <li>Carry</li> </ul>				

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Criteria		Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	ProcessPAssessmentA	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
	2.4	(a) Installing	- Projectormu	out a test of the D.C. machine • Clean the work area.	D.C. machines	Knowledge	This unit can be	23
	2.4 Installing the control system of the D.C. machine.	(a) Installing diverter in the armature.	<ul> <li>Brainstorm: Guide students to explore the procedures for installing a diverter in the armature.</li> <li>Think-ink-pair share Guide the students to identify types of diverters.</li> <li>Internet and Library Search Guide the students to search for relevant information about installing a diverter in the armature circuit of a D.C. machine.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret control diagrams.</li> <li>Identify types and ratings of D.C. machine controls.</li> <li>Prepare the base of D.C. machine control.</li> <li>Mark the location for installing the machine D.C. control systems.</li> <li>Fix and align the D.C. machine control.</li> <li>Install and terminate cables of the D.C. machine control.</li> </ul>	D.C. machines control fixed, installed, and functions as per the manufacturer's manual specifications.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to install the diverter in the armature.</li> <li>Principles: The student should explain the principles relating to installing a diverter in the armature.</li> <li>Theories: The student should explain:</li> <li>The three basic types of D.C. machines.</li> <li>The commutation process.</li> </ul>	<ul> <li>achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Rawl plugs</li> <li>A set of screwdrivers</li> <li>A set of spanners</li> <li>Megger</li> <li>Combination pliers</li> <li>Electrician's knife</li> <li>Clamp on meter</li> <li>Multimeter</li> <li>Insulation tester</li> <li>Safety goggles</li> <li>Safety boots</li> <li>Leather and plastic gloves</li> </ul>	23

Module Title	Unit Title	Elements	Suggested Teachin	g	Assessment Crit	eria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learnin Methods	g Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
				<ul> <li>Test the D.C. machine control.</li> <li>Apply safety precautions.</li> <li>Clean th workplace.</li> </ul>	e	<ul> <li>Speed regulation applied to D.C. machines.</li> <li>The armature reaction in D.C. machines.</li> <li>The Application of different types of D.C. machines.</li> <li>Circumstantial knowledge Detailed knowledge about:</li> <li>Safety precautions on maintaining the speed of D.C. machines.</li> </ul>	• Overalls	
		(b) Installing varistor in the field winding.	<ul> <li>Brainstorm: Guide students to explore the uses of varistors.</li> <li>Think-ink- pairshare Guide the students to identify types of varistors.</li> <li>Internet and Library Search Guide students to search for relevant</li> </ul>	<ul> <li>The student should be able to:</li> <li>Interpret control diagrams.</li> <li>Identify type and ratings of D.C. machin controls.</li> <li>Prepare the base of D.C. machine control.</li> </ul>	D.C. machines control fixed, installed, and functions as per the manufacturer's manual of specifications.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to install a varistor in the field winding. Principles: The student should explain the principles relating to installing varistor in the field	<ul> <li>This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available Rawl plugs</li> <li>A set of screwdrivers</li> <li>A set of spanners</li> <li>Megger</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crit	eria	Training	Number
(Main Competency)	(Specific Competen	(Learning	and Methods	Learning	Process	Product/Service	Knowledge	Requirements/ Suggested	of Periods
Module Title (Main Competency )	Unit Title (Specific Competen cies)	Elements (Learning Activities)	Suggested and Methods informat installing in the fie winding.	Teaching Learning	<ul> <li>Process Assessment</li> <li>Mark the location for installing th D.C. machine control systems.</li> <li>Fix and alig the D.C. machine control.</li> <li>Install and terminate cables of th D.C. machine control.</li> </ul>	Assessment Crit Product/Service Assessment ne ine gn e ne	eria Knowledge Assessment winding. Theories: The student should explain: The three basic types of D.C. machines. The commutation process. Speed regulation applied to D.C. machines. The armature reaction in D.C.	Training Requirements/ Suggested Resources• Combination pliers• Electrician's knife• Clamp on meter• Multimeter• Insulation tester• Safety goggles• Safety boots• Leather and plastic gloves• Overalls.	Number of Periods per Unit
		(c) Starting a	• Brainsto	rm:	<ul> <li>control.</li> <li>Test the D. machine control.</li> <li>Apply safe precautions</li> <li>Clean the workplace.</li> </ul>	C. ty s. D.C. machines	reaction in D.C. machines. The Application of different types of D.C. machines. Circumstantial knowledge Detailed knowledge about: Safety precautions on maintaining the speed of D.C. machines.	• This unit can be	
		D.C. machine by	Guide st explore t	tudents to	should be able to:	control fixed, installed and	evidence: Detailed knowledge	achieved at the workplace or	
		ince of				mouned and	2 control monteuge	workplace of	

Module Title	Unit Title	Elements	Suggested	g Assessment Criteria				Training	Number	
(Main	(Specific	(Learning	and	Learning	Proce	ess l	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods		Assess	sment A	Assessment	Assessment	Suggested	per Unit
	cies)								Resources	
		using an autotransfor mer starter.	<ul> <li>autotransfin starting machine.</li> <li>Think-inlishare Guide the to identify Autotrans and their rishare Internet Library S Guide to search relevant information starting a machine autotransist starter. </li> </ul>	formers g a D.C. k-pair e students y types of formers ratings. and Search students for on about D.C. using an former	<ul> <li>Int</li> <li>Int</li> <li>condition</li> <li>condition</li> <li>Predistrian</li> <li>condition</li> <li>Predistrian</li> <li>condition</li> <li>Mail local</li> <li>mail local</li> <li>condition</li> <li>Mail local</li> <li>condition</li> <li>Mail local</li> <li>condition</li> <li>Fission</li> <li>Fissi</li></ul>	terpret agrams. entify type d ratings o .C. machino ontrols. epare the use of D.C. achine ontrol. ark the cation for stalling the achine D.C. achine ontrol stems. x and align e D.C. achine ontrol. stall and rminate bles of the .C. machino ontrol. est the D.C. achine ontrol. stall and rminate bles of the .C. machino ontrol. est the D.C. achine ontrol. est the D.C. achine ontrol.	functions as per manufacturer's manual specifications. f e c. h e c.	<ul> <li>of: Method used: The student should explain how to start a D.C. machine by using an autotransformer starter.</li> <li>Principles: The student should explain the principles relating to starting a D.C. machine by using an autotransformer starter.</li> <li>Theories: The student should explain:</li> <li>The three basic types of D.C. machines.</li> <li>The commutation process.</li> <li>Speed regulation applied to D.C. machines.</li> <li>The armature reaction in D.C. machines.</li> <li>The Application of different types</li> </ul>	<ul> <li>training</li> <li>institution. The following tools, safety gear, and equipment are to be available</li> <li>Rawl plugs</li> <li>A set of screwdrivers</li> <li>A set of spanners</li> <li>Megger</li> <li>Combination pliers</li> <li>Electrician's knife</li> <li>Clamp on meter</li> <li>Multimeter</li> <li>Insulation tester</li> <li>Safety goggles</li> <li>Safety boots</li> <li>Leather and plastic gloves</li> <li>Overalls</li> </ul>	

Module Title	Unit Title	Elements	Suggested Teaching	Assessment Criteria			Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
	2.5 Installing eelectronic s soft starter.	(a) Carrying out the installation of thyristor control circuits.	<ul> <li>Brainstorm: Guide the student to define a thyristor.</li> <li>Practical work: Guide the student to identify types of thyristor.</li> <li>Activity: Arrange the students in groups carrying out the installation of tthyristor control circuits.</li> </ul>	The students will be able to: • Interpret the control wiring diagram • Identify ratings of electron ic soft starters. • Mark	The electronic soft starter is fixed, installed, and functions as per the manufacturer's manual specifications.	of D.C. machines. Circumstantial knowledge Detailed knowledge about: Safety precautions on maintaining the speed of D.C. machines. Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to carry out the installation of thyristor control circuit. Principles: The student should explain the principles relating to installation of thyristor control circuits. Theories: The trainee	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Rawl plugs</li> <li>A set of screwdrivers</li> <li>Cross peen hammer</li> <li>Diagonal cutting pliers</li> <li>Combination pliers</li> </ul>	16
				the location where the electron ic soft starter		<ul> <li>should explain:</li> <li>The application of the electronic soft starter.</li> <li>The mechanism of the main components of</li> </ul>	<ul> <li>Electrician's knife</li> <li>Multimeter</li> <li>Clamp on meter</li> <li>Overalls</li> <li>Leather and</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
<b>Competency</b> )	Competen	Activities)	Methods	8	Assessment	Assessment	Assessment	Suggested	per Unit
1 57	cies)	,						Resources	1
	,								
					will be		an electronic soft	plastic gloves	
					installed		starter.	<ul> <li>Safety goggles</li> </ul>	
							Circumstantial	• Drilling	
					• Fix and		knowledge	machined	
					align the		Detailed knowledge	machinea.	
					electron		about:		
					ic soft		<ul> <li>Safety</li> </ul>		
					starter		precautions of		
					to the		electronic soft		
					position		starter		
					<ul> <li>Install</li> </ul>		starter.		
					• Instan				
					torminat				
					e cables				
					of the				
					electron				
					1C SOIT				
					starter.				
					• Test the				
					electron				
					ic soft				
					starter.				
					• Test for				
					operatio				
					n of the				
					system.				
					• Apply				
					safety				
					precauti				
					ons.				
					• Clean				
					the				
					workpla				

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
				ce.				
		(b) Carrying out the installation of TRIAC control circuits.	<ul> <li>Brainstorm: Guide the student to define TRIAC.</li> <li>Practical work: Guide the student to identify types of TRIACs.</li> <li>Activity: Arrange the students in groups carrying out the installation of TRIAC control circuits.</li> </ul>	The students will be able to: Interpret the control wiring diagram . Identify ratings of electron ic soft starters. Mark the location where the electron ic soft starter will be installed . Fix and align the electron ic soft	The electronic soft starter is fixed, installed, and functions as per the manufacturer's manual specifications.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to: ccarry out the installation of TRIAC control circuits. Principles: The student should explain the principle related to carrying out the installation of TRIAC control circuits. Theories: The student should explain: • The application of the electronic soft starter. • The mechanism of the main components of an electronic soft starter. Circumstantial knowledge Detailed knowledge about:	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Rawl plugs • A set of screwdrive rs • Cross peen hammer • Diagonal cutting pliers • Combinati on pliers • Electrician 's knife • Multimeter • Clamp on meter • Overall • Leather and plastic gloves • Safety	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	Requirements/	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
					starter		Safety precautions of	goggles	
					to the		the electronic soft	5055103	
					position.		starter		
					• Install				
					and				
					terminat				
					e cables				
					of the				
					electron				
					ic soft				
					starter.				
					• Test the				
					electron				
					ic soft				
					starter.				
					• Test for				
					operatio				
					n of the				
					system.				
					Apply				
					safety				
					precauti				
					ons.				
					• Clean				
					the				
					workpla				
					ce.				
		(c) Carrying	Brains	torm:	The	The electronic soft	Knowledge	This unit can be	
		out the	Guide	students to	students	starter is fixed,	evidence:	achieved at the	
		installation	explore	the uses of	will be able	installed, and	Detailed knowledge	workplace or	
		of	PLCs		to:	functions as per the	of:	training institution.	
		programmab	• Think-	ink-pair	• Interpret	manufacturer's	Method used: The	The following	
		le logic	share		the	manual	student should	tools, safety gear,	

Module Title	Unit Title	Elements	Suggested	Teaching			Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Pro	cess	<b>Product/Service</b>	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods		Asse	essment	Assessment	Assessment	Suggested	per Unit
	cies)								Resources	
		control	Guide t	he students		control	specifications.	explain how to:	and equipment are	
		(PLC)	to ident	ify types of		wiring		<ul> <li>Carry out the</li> </ul>	to be available:	
		circuits.	PLCs.			diagram		installation of	<ul> <li>Rawl plugs</li> </ul>	
			Interne	t and		•		programmable logic	<ul> <li>A set of</li> </ul>	
			Library	y Search	•	Identify		controller (PLC)	screwdrivers	
			Guide studer	nts to		ratings		circuit.	<ul> <li>Cross peen</li> </ul>	
			search for re	levant		of		Principles: The	hammer	
			information	about		electron		student should	<ul> <li>Diagonal</li> </ul>	
			carrying out	the		ic soft		explain principles	cutting pliers	
			installation of	of		starters.		related to the	<ul> <li>Combination</li> </ul>	
			programmab	ole logic	•	Mark		installation of	pliers	
			control (PLC	C).		the		programmable logic	<ul> <li>Electrician's</li> </ul>	
						location		controller circuits.	knife	
						where		Theories: The	<ul> <li>Multimeter</li> </ul>	
						the		student should	<ul> <li>Clamp on</li> </ul>	
						electron		explain:	meter	
						ic soft		<ul> <li>The application</li> </ul>	<ul> <li>Overalls</li> </ul>	
						starter		of the electronic soft	<ul> <li>Leather and</li> </ul>	
						will be		starter.	plastic gloves	
						installed		<ul> <li>The mechanism</li> </ul>	<ul> <li>Safety goggles</li> </ul>	
						•		of the main	■ Drilling	
					•	Fix and		components of an	machined.	
						align the		electronic soft starter.		
						electron		Circumstantial		
						ic soft		knowledge		
						starter		Detailed knowledge		
						to the		about:		
						position.		Safety precautions of		
					•	Install		electronic soft starter		
						and				
						terminat				
						e cables				
						of the				

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>electron ic soft starter.</li> <li>Test the electron ic soft starter.</li> <li>Test for operatio n of the system.</li> <li>Apply safety precauti ons.</li> <li>Clean the workpla ce.</li> </ul>				
3.0 Servicing electric machines.	3.1 Performing rewinding of electric motor.	3.(a) Rewinding single-phase motors.	<ul> <li>Field vi Organis in a gro whole c a motor shop.</li> <li>Guest s Invite a speaker the proo rewindi phase n</li> <li>Group discuss</li> </ul>	isit: te students up or a class to visit rewinding <b>peaker:</b> guest to explain cedures for ng single- notors. ion:	<ul> <li>Select tools,</li> <li>equipment,</li> <li>and safety</li> <li>gear.</li> <li>Record</li> <li>nameplate</li> <li>data.</li> <li>Disasse</li> <li>mble motor.</li> <li>Draw a</li> <li>winding</li> <li>diagram.</li> <li>Remove</li> </ul>	Single-phase motors rewound as per technical specifications, NEMA standards, and IEE Regulations.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to rewind single-phase motors. Principles: The student should explain the principles related to rewinding single-phase motors.	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Electrician's tool kit</li> <li>Coil tripping chisel</li> <li>Commutator Slotting Files</li> </ul>	42
Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
---------------------	------------	-------------	-----------	--------------	-----------------------------	------------------	-------------------------------------	------------------------------------	------------
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
<b>Competency</b> )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	-
			Guide s	tudents to	old winding		Theories: The	Tubing cutter	
			present	a report for	and note		student should	• Wire cutters or	
			the field	l visit.	down the		explain:	wire strippers	
					number of		• Types of motor	• Adjustable	
					turns.		rewinding.	wrench	
					• Clean		<ul> <li>Taking data and</li> </ul>	Armature	
					gaps/ slots.		calculation.	wedge remover	
					• Insert		Core Testing.	• Slot cleaning	
					the		Winding	brushes	
					insulating		stripping	<ul> <li>Power hand</li> </ul>	
					paper in the		pprocedures.	drill	
					stator.		• Core	• Propane torch	
					• Wind		preparation.	Chamfering	
					new coil.		• Coil making.	ools	
					• Bind the		• Winding	<ul> <li>Coil making</li> </ul>	
					coil and		insulation and	machine	
					varnish the		coil iinsertion.	Hammers &	
					motor.		• Internal	mallets	
					<ul> <li>Assembl</li> </ul>		cconnections.	<ul> <li>Hand held</li> </ul>	
					e the back		• Lacing and	grinders	
					bearing and		bracing of	<ul> <li>Slotting files</li> </ul>	
					fan.		windings.	<ul> <li>Wedge drivers</li> </ul>	
					• Perform		• Inspection of	Wedge	
					necessary		untreated	removers	
					measuremen		windings.	Rearing	
					ts and tests		Testing	remover	
					for		untreated and	(nuller)	
					verification		treated	Chicele	
					of		windings.	Butane	
					termination.		Winding	- Dutane	
					• Test the		treatment.	loich	
					rewound		Circumstantial		
					motors.		knowledge		

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	Training	Number	
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
				<ul> <li>Observe safety precautions.</li> <li>Clean tools, equipment, and work area.</li> </ul>		<ul> <li>Detailed knowledge about:</li> <li>Safety precautions when handling motors.</li> <li>Properties of materials</li> </ul>		
		(b) Rewinding three-phase motors.	<ul> <li>Field visit: Organise students in a group or a whole class to visit a motor rewinding shop.</li> <li>Guest speaker: Invite a guest speaker to explain the procedures of rewinding three- phase motors.</li> <li>Group discussion: Guide students to present a report for the field visit.</li> </ul>	<ul> <li>Select tools, equipment, and safety gear.</li> <li>Record nameplate data.</li> <li>Disasse mble motor.</li> <li>Draw a winding diagram.</li> <li>Remove old winding and note down the number of turns.</li> <li>Clean gaps/ slots.</li> <li>Insert the insulating</li> </ul>	Three-phase motors Rewound as per technical specifications, NEMA standards, and IEE Regulations.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to rewind three-phase motors: Principles: The student should explain the principles related to rewinding three-phase motors. Theories: The student should explain: • Type of motor rewinding. • Taking data and calculation. • Core Testing. • Winding stripping procedures.	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available should be available:</li> <li>Electrician's tool kit</li> <li>Coil tripping chisel</li> <li>Commutator Slotting Files</li> <li>Tubing cutter</li> <li>Wire cutters or wire strippers</li> <li>Adjustable wrench.</li> <li>Armature wedge remover.</li> <li>Slot Cleaning</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	eria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>paper in the stator.</li> <li>Wind new coil</li> <li>Bind the coil and varnish the motor.</li> <li>Assembl e the back bearing and fan.</li> <li>Perform necessary measurements and tests for verification of termination.</li> <li>Test the rewound motors.</li> <li>Observe safety precautions.</li> <li>Clean tools, equipment and work area.</li> </ul>		<ul> <li>Core Preparation.</li> <li>Coil making.</li> <li>Winding insulation and coil Insertion.</li> <li>Internal connections.</li> <li>Lacing and bracing of windings.</li> <li>Inspection of untreated windings.</li> <li>Testing untreated and treated windings.</li> <li>Winding treatment.</li> <li>Circumstantial knowledge Detailed knowledge about:</li> <li>Safety precautions when handling motors.</li> <li>Properties of materials</li> </ul>	<ul> <li>Brushes</li> <li>Power hand drill</li> <li>Propane torch</li> <li>Chamfering Tools,</li> <li>Coil making machine</li> <li>Hammers &amp; Mallets,</li> <li>Hand held grinders,</li> <li>Slotting Files,</li> <li>Wedge Drivers,</li> <li>Wedge Removers,</li> <li>Bearing remover (puller)</li> <li>Chisels Butane torch</li> </ul>	

odule Title Unit Title El	Elements	Suggested Teaching	Assessment Crit	Training	Number	
Iain(Specific(L	Learning	and Learning	Process Product/Service	Knowledge	Requirements/	of Periods
Sompletency ) Competen Ac	Activities)	Methods	Assessment Assessment	Assessment	Suggested	per Unit
cles)					Resources	
	ewinding .C. motors.	<ul> <li>Field visit: Organise students in a group or a whole class to visit a motor rewinding shop.</li> <li>Guest speaker: Invite a guest speaker to explain the procedures of rewinding D.C. motors.</li> <li>Group discussion: Guide students to present a report for the field visit.</li> </ul>	<ul> <li>Select tools, equipme nt, and safety gear.</li> <li>Record namepla te data.</li> <li>Disasse mble motor.</li> <li>Draw a winding diagram</li> <li>Remove old winding and note down the number of turns.</li> <li>Clean gaps/ slots.</li> <li>Insert the insulatin g paper in the stator.</li> </ul>	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to rewind D.C. motors.</li> <li>Principles: The student should explain the principles related to rewinding D.C. motors.</li> <li>Theories: The student should explain:</li> <li>The types of motor rewinding.</li> <li>Taking data and calculation.</li> <li>Core testing.</li> <li>Winding stripping procedures.</li> <li>Core preparation.</li> <li>Coil making.</li> <li>Winding insulation and coil insertion.</li> <li>Internal connections</li> <li>Lacing and bracing of</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Electrician's tool kit</li> <li>Coil tripping chisel</li> <li>Commutator Slotting Files</li> <li>Tubing cutter</li> <li>Wire cutters or wire strippers</li> <li>Adjustable wrench</li> <li>Armature wedge remover</li> <li>Slot cleaning brushes</li> <li>Power hand drill</li> <li>Propane torch</li> <li>Chamfering tools,</li> <li>Coil making machine</li> <li>Hammers and Mallets</li> <li>Hand held</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	eria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	Requirements/	of Periods
<b>Competency</b> )	Competen	Activities)	Methods	-	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	-
					• Wind		windings.	grinders	
					new		• Inspection of	• Slotting files	
					coil.		untreated	Wedge drivers	
					• Bind the		windings	• Wedge	
					coil and		• Testing	removers	
					varnish		untreated and	Bearing	
					the		treated	remover	
					motor.		windings.	(puller)	
					• Assembl		• Winding	Chisels	
					e the		treatment.	Chibelb	
					back		Circumstantial		
					bearing		knowledge		
					and fan.		Detailed		
					• Perform		knowledge		
					necessar		ahout		
					V		• Safety		
					measure		precautions when		
					ments		handling motors		
					and tests		<ul> <li>Properties of</li> </ul>		
					for		• Tropenies of materials		
					verificat		materials		
					ion of				
					terminat				
					ion.				
					• Test the				
					rewoiin				
					d				
					motors.				
					Observe				
					safety				
					precauti				
					ons				
					Clean				

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	Training	Number	
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
				tools, equipme nt and work area.				
	3.2 Performing rewinding of transforme rs.	(a) Rewinding single-phase transformer.	<ul> <li>Field visit: Organise students in a group or a whole class to visit a transformer rewinding shop.</li> <li>Guest speaker: Invite a guest speaker to explain the procedures for rewinding single- phase transformers.</li> <li>Group discussion: Guide students to present a report for the field visit.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipme nt, and safety gear.</li> <li>Record namepla te data.</li> <li>Strip transfor mer (disman tle laminati ons).</li> <li>Remove</li> </ul>	Single-phase transformer rewound as per technical specifications, and IEE Regulations.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to rewind single-phase transformers. Principles: The student should explain the principles relating to rewinding of a single-phase transformer. Theories: The student should explain: • Types of transformer windings.	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available</li> <li>Electrician's tool kit</li> <li>Coil tripping chisel</li> <li>Electrician's knife</li> <li>Tubing cutter</li> <li>Wire cutters or wire strippers</li> <li>Digital calliper</li> <li>Bobbin holder</li> <li>Slot cleaning</li> </ul>	43

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	<b>Product/Service</b>	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods	-	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	-
					old		<ul> <li>Taking data and</li> </ul>	brushes	
					winding		calculation.	Power hand	
					and note		• Core testing.	drill	
					down		Winding	Propane torch	
					the		stripping	Chamfering	
					number		procedures.	tools	
					of turns.		• Coil making.	• Coil making	
					• Determi		Winding	machine	
					ne wire		insulation.	Hammers and	
					size.		• Internal	mallets	
					• Clean		connections.	• Hand held	
					magneti		• Testing untreated	grinders	
					c core.		and treated	• Slotting files	
					<ul> <li>Design</li> </ul>		windings.	• Wedge	
					a new		Winding	Removers	
					bobbin.		treatment.	rtemo verb	
					<ul> <li>Wind</li> </ul>		Circumstantial		
					new		knowledge		
					coil.		Detailed knowledge		
					• Bind the		about:		
					coil and		Safety		
					varnish		precautions when		
					the		handling		
					winding		transformers.		
							• Properties of		
					• Set the		materials		
					transfor				
					mer for				
					curing.				
					•				
					Perform				
					necessar				
					y tests				

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements/</b>	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
					for				
					verificat				
					ion of				
					terminat				
					ion.				
					• Test				
					the				
					rewoun				
					d				
					transfor				
					mer as				
					per				
					technica				
					l standard				
					s and				
					IEE				
					Regulati				
					ons.				
					Observe				
					safety				
					precautions.				
					• Clean				
					tools,				
					equipment,				
					and work				
		(b)	• Dialit		area.	Three phase	Knowledge	This unit can be	
		Rewinding	• Fleid V	ISIL:	should be	transformer rewound	evidence	achieved at the	
		three-phase	in a oro	in or a	able to	as per technical	Detailed knowledge	workplace or	
		transformer.	whole of	lass to visit	Select	specifications, and	of:	training institution.	
			a transf	ormer	tools,	IEE Regulations.	Method used: The	The following	
			rewindi	ng shop.	equipment,	Ũ	student should	tools, safety gear,	

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
			<ul> <li>Guest speaker: Invite a guest speaker to explain the procedures of rewinding a three- phase transformer.</li> <li>Group discussion: Guide students to present a report for the field visit.</li> </ul>	<ul> <li>and safety gear.</li> <li>Record namepla te data.</li> <li>Strip transfor mer (disman tle laminati ons).</li> <li>Remove old winding and note down the number of turns.</li> <li>Determi ne wire size.</li> <li>Clean magneti c core.</li> <li>Design a new bobbin.</li> <li>Wind new coil.</li> <li>Bind the</li> </ul>		<ul> <li>explain how to rewind three-phase transformers.</li> <li>Principles: The student should</li> <li>explain the principles related to rewinding of three-phase transformers.</li> <li>Theories: The student should</li> <li>explain:</li> <li>Types of transformer windings.</li> <li>Taking Data and calculations.</li> <li>Core Testing.</li> <li>Winding stripping procedures.</li> <li>Coil making.</li> <li>Winding insulation.</li> <li>Internal connections</li> <li>Testing untreated and treated windings.</li> <li>Winding treatment.</li> <li>Circumstantial knowledge</li> </ul>	<ul> <li>and equipment are to be available e available:</li> <li>Electrician's tool kit</li> <li>Coil tripping chisel</li> <li>Electrician's knife</li> <li>Tubing cutter</li> <li>Wire cutters or wire strippers</li> <li>Digital calliper</li> <li>Bobbin holder</li> <li>Slot Cleaning brushes</li> <li>Power hand drill</li> <li>Propane torch</li> <li>Chamfering tools</li> <li>Coil making machine</li> <li>Hammers and mallets</li> <li>Hand held grinders</li> <li>Slotting Files,</li> <li>Wedge removers, Chise ls</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	Requirements/	of Periods
<b>Competency</b> )	Competen	Activities)	Methods	-	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	-
					coil and		Detailed knowledge		
					varnish		about:		
					the		<ul> <li>Safety</li> </ul>		
					winding		precautions when		
							handling		
					• Set		transformers.		
					transfor		• Properties of		
					mer for		materials		
					curing.				
					•				
					Perform				
					necessary				
					tests for				
					verification				
					of				
					termination.				
					• Test				
					the rewound				
					transformer				
					as per				
					technical				
					standards				
					and IEE				
					Regulations.				
					• Observe				
					safety				
					precautions.				
					• Clean				
					tools,				
					equipment,				
					and work				
					area.				

Module Title	Unit Title	Elements	Sug	gested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and		Learning	Process	<b>Product/Service</b>	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Met	thods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)								Resources	
		(c)Rewindin	•	Field vi	sit:	The student	Auto transformer	Knowledge	This unit can be	
		g auto-		Organis	e students	should be	rewound as per	evidence:	achieved at the	
		transformer		in a grou	up or a	able to:	technical	Detailed knowledge	workplace or	
				whole cl	lass to visit	<ul> <li>Select</li> </ul>	specifications, and	of:	training institution.	
				a transfo	ormer	tools,	IEE Regulations	Method used: The	The following	
				rewindir	ng shop.	equipment,		student should	tools, safety gear,	
			•	Guest s	peaker:	and safety		explain how to	and equipment are	
				Invite a	guest	gear.		rewind auto-	to be available:	
				speaker	to explain	• Record		transformer.	<ul> <li>Electrician's</li> </ul>	
				the proc	edures of	nameplate		Principles: The	tool kit	
				rewindin	ng	data.		student should	<ul> <li>Coil tripping</li> </ul>	
				autotran	sformers.	<ul> <li>Strip</li> </ul>		explain the principles	chisel	
			•	Group		transformer		of rewinding a	<ul> <li>Electrician's</li> </ul>	
				discussi	on:	(dismantle		transformer.	knife	
				Guide st	tudents to	laminations).		Theories: The	• Tubing cutter	
				present a	a report for	• Remove		student should	• Wire cutters or	
				the field	visit.	old winding		explain:	wire strippers	
						and note		• The types of	• Digital calliper	
						down the		transformer	Bobbin holder	
						number of		windings.	<ul> <li>Slot cleaning</li> </ul>	
						turns.		<ul> <li>Taking data and</li> </ul>	brushes	
						• Determi		calculations.	<ul> <li>Power hand</li> </ul>	
						ne wire size.		<ul> <li>Core Testing.</li> </ul>	drill	
						• Clean		<ul> <li>Winding</li> </ul>	Pronane torch	
						magnetic		stripping	Chamfering	
						core.		procedures.	- channering	
						• Design		• Coil making.	Coil making	
						a new		Winding	• Con making	
						bobbin.		iinsulation.		
						• Wind a		• Internal	• nammers and	
						new coil.		connections.	IIIaiicis,	
						• Bind the		<ul> <li>Testing untreated</li> </ul>		
						coil and		and treated	grinders	
						con una		and dealed	<ul> <li>Slotting files</li> </ul>	

Module Title	Unit Title	Elements	Suggeste	d Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>varnish the winding.</li> <li>Set transformer for curing.</li> <li>Perform necessary tests for verification of termination.</li> <li>Test the rewound transformer as per technical standards and IEE Regulations.</li> <li>Observe safety precautions.</li> <li>Clean tools, equipment, and work area.</li> </ul>		<ul> <li>windings.</li> <li>Winding treatment.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precautions when handling transformers.</li> <li>Properties of materials</li> </ul>	<ul> <li>Wedge removers</li> <li>Chisels</li> </ul>	
4.0 Installing programmable logic controllers.	4.1 Installing PLCs component s/accessori	(a) Installing the power supply unit.	Inte Libi Guid sear info	rnet and ary Search: le students to th for relevant mation about	The student should be able to: • Select tools,	Installation of the power unit supply of the PLC is performed as per technical specifications, and	Knowledge evidence: Detailed knowledge of: Method used: The	This unit can be achieved at the workplace or training institution. The following	20

Module Title	Unit Title	Elements	Suggested Tea	ching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and Lea	rning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
(Main Competency )	(Specific Competen cies) es.	(Learning Activities)	<ul> <li>installing PL0 components/a ories.</li> <li>ICT-based learning Prepare a vid clip showing basic principli installing PL0 components/a ories.</li> <li>Group discussion: Guide studen present what see in the vid clip.</li> </ul>	rning Caccess eo the es of Caccess ts to they eo	<ul> <li>Process Assessment</li> <li>equipme nt, and safety gear.</li> <li>Interpret circuit diagram .</li> <li>Check the hardwar e availabil ity.</li> <li>Connect individu al compon ents.</li> <li>Connect compon ents to a terminal block.</li> <li>Fit enclosur</li> </ul>	Product/Service Assessment IEE Regulations.	Knowledge Assessment student should explain how to: install the PLC power supply unit. <b>Principles:</b> The student should explain the principles related to installing the power supply unit. <b>Theories:</b> The student should explain how to <b>Circumstantial</b> <b>knowledge</b> <b>Detailed knowledge</b> <b>about:</b> • Safety precautions	Requirements/ Suggested Resources tools, safety gear, and equipment are to be available • Electrician's tool kit • Wire cutters or wire strippers • PLC • PLC trainer • Training module • Discrete PLC inputs (pre- wired) • Discrete PLC outputs (pre- wired) • Discrete PLC outputs (pre- wired) • Programming cable • Graphic User Interface • Power supply • Desktop computer	of Periods per Unit
					e to assembl y. • Ensure proper groundi ng.			<ul> <li>Precision screw driver set</li> <li>Digital probes</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	Requirements/	of Periods
Competency )	Competen cies)	Activities)	Methods		Assessment	Assessment	Assessment	Suggested Resources	per Unit
	cics)							Resources	
					• Ensure				
					minimu				
					m				
					spacing				
					to allow				
					effectiv				
					e				
					cooling.				
					• Test the				
					installed				
					PLC.				
					Observe				
					safety				
					precauti				
					ons.				
					• Clean				
					tools				
					equipme				
					nt, and				
					work				
					area.				
		(b) Installing	Interne	t and	The student	Installation of I/O of	Knowledge	• This unit can	
		I/O unit	Library	y Search:	should be	the PLC unit is	evidence:	be achieved at	
			Guide s	tudents to	able to:	performed as per	Detailed knowledge	the workplace	
			search f	or relevant	• Select	technical		or training	
			informa	tion about	tools,	specifications, and	wiethod used: The	institution. The	
			installin	ig I/O unit.	equipme	IEE Regulations.	student should	tollowing	
			• ICT-ba	sed	nt, and		explain now to install $U_{0}$ and the second seco	tools, safety	
			learnin	g .,	safety		I/U unit Dringinlage The	gear, and	
			Prepare	a video	gear.		student should	equipment are	
			clip sho	wing the	• Interpret		student should	to be available	
			basic pr	inciples for	circuit		explain the principles	Electrician's	
			installir	Ig PLC I/O	diagram		related to installing	tool kit	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods	_	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
			unit. • Group discussio Guide stu present w see in the clip.	on: udents to vhat they e video	<ul> <li>Check the hardwar e availabil ity.</li> <li>Connect individu al compon ents.</li> <li>Connect compon ents to a terminal block.</li> <li>Fit enclosur e to assembl y.</li> <li>Ensure proper groundi ng.</li> <li>Ensure minimu m spacing to allow</li> </ul>		an I/O unit. <b>Theories:</b> The student should explain: • I/O unit of a PLC. <b>Circumstantial</b> <b>knowledge</b> <b>Detailed knowledge</b> <b>about</b> • Safety precautions when handling I/O unit.	<ul> <li>Wire cutters or wire strippers</li> <li>PLC</li> <li>PLC trainer</li> <li>Training module</li> <li>Discrete PLC inputs (pre- wired)</li> <li>Discrete PLC outputs (pre- wired)</li> <li>Programming cable</li> <li>Graphic User Interface</li> <li>Power supply</li> <li>Desktop computer</li> <li>Multimeter</li> <li>Precision screw driver set</li> <li>Digital probes</li> <li>Safety boots</li> <li>Safety goggles</li> </ul>	
					minimu m spacing to allow effectiv e				

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
					cooling.				
					• Test the				
					installed				
					PLC.				
					Observe				
					safety				
					precauti				
					ons.				
					• Clean				
					tools,				
					equipme				
					nt, and				
					WOrk				
			<b>.</b>	. 1	area.	Carefornia da CDU	Vl-l		
		(C)	• Interne	et and	The student	Configuring the CPU	Knowledge	This unit can be	
		the CDU	Librar	y Search:	should be	of the PLC is	evidence:	achieved at the	
		the CPU	Guide s	tudents to	able to:	technical	Detailed Knowledge	training institution	
			search	or relevant	• Select	specifications and	01: Mathad usad: The	The following	
			configu	ring the		IFF Regulations	student should	tools safety gear	
			CPU	ing the	equipilie nt and	ILL Regulations.	explain how to	and equipment are	
				sed	safety		configure the CPU.	to be available:	
			- ICI-Da learnin	σ	gear		Principles	Electrician's tool	
			Prepare	a video	Interpret		The student should	kit	
			clip sho	wing the	circuit		explain the principles	• Wire cutters or	
			basic p	inciples of	diagram		related to configuring	wire strippers	
			configu	ring PLC			the CPU.	• PLC	
			CPU.	0	• Check		Theories: The	PLC trainer	
			• Group		the		student should	Training	
			discuss	ion:	hardwar		explain (Incomplete	module	
			Guide s	tudents to	e		sentence)	Discrete PLC	
			present	what they	availabil		• CPU	inputs (pre-	
			see in the	ne video	ity.		Circumstantial	wired)	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods	_	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	_
			clip.		• Connect		knowledge	Discrete PLC	
					individu		Detailed knowledge	outputs (pre-	
					al		about:	wired)	
					compon		<ul> <li>Safety</li> </ul>	<ul> <li>Programming</li> </ul>	
					ents.		precautions when	cable	
					• Connect		handling PLC CPU.	Graphic User	
					compon			Interface	
					ents to a			• Power supply	
					terminal			Desktop	
					block.			computer	
					• Fit			• Multimeter	
					enclosur			Precision screw	
					e to			driver set	
					assembl			• Digital probes	
					у.			<ul> <li>Safety boots</li> </ul>	
					• Ensure			<ul> <li>Safety goggles</li> </ul>	
					proper			Survey 5055105	
					groundi				
					ng.				
					• Ensure				
					minimu				
					m				
					spacing				
					to allow				
					effectiv				
					e				
					cooling.				
					• Test the				
					installed				
					PLC.				
					• Observe				
					safety				
					precauti				

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
		(d) Connecting the PLC to	Internet and Library Search: Guide students to	<ul> <li>ons.</li> <li>Clean tools, equipme nt, and work area.</li> <li>The student should be able to:</li> </ul>	Connection of the CPU of the PLC is performed as per	Knowledge evidence: Detailed knowledge	This unit can be achieved at the workplace or	
		the plant.	<ul> <li>search for relevantinformatio n about connecting the PLC to the plant.</li> <li>ICT-based learning Prepare a video clip showing the basic principles for connecting the PLC to the plant.</li> <li>Group discussion: Guide students to present what they see in the video clip.</li> </ul>	<ul> <li>Select tools, equipme nt, and safety gear.</li> <li>Interpret circuit diagram         <ul> <li>Check the hardwar e availabil ity.</li> <li>Connect individu al compon ents.</li> </ul> </li> </ul>	technical specifications, and IEE Regulations.	of: Method used: The student should explain how to connect the PLC to the plant. Principles: The student should explain the principles related to connecting the PLC to the plant. Circumstantial knowledge Detailed knowledge about: • Safety precautions when handling PLC.	<ul> <li>training institution.</li> <li>The following</li> <li>tools, safety gear,</li> <li>and equipment are</li> <li>to be available</li> <li>should be available:</li> <li>Electrician's</li> <li>tool kit</li> <li>Wire cutters or wire strippers</li> <li>PLC</li> <li>PLC trainer</li> <li>Training module</li> <li>Discrete PLC inputs (prewired)</li> <li>Discrete PLC outputs (prewired)</li> <li>Programming cable</li> <li>Graphic User</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements/</b>	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
					ents to a			Interface	
					terminal			• Power supply	
					block.			<ul> <li>Desktop</li> </ul>	
					• Fit			computer	
					enclosur			• Multimeter	
					e to			Precision	
					assembl			screwdriver set	
					у.			<ul> <li>Digital probes</li> </ul>	
					• Ensure			Safety boots	
					proper			• Safety goggles	
					groundi			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
					ng.				
					<ul> <li>Ensure</li> </ul>				
					minimu				
					m				
					spacing				
					to allow				
					effectiv				
					e				
					cooling.				
					• Test the				
					installed				
					PLC.				
					Observe				
					safety				
					precauti				
					ons.				
					• Clean				
					tools,				
					equipme				
					nt.				
					• Clean				
					tools,				

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
	4.2	(a) Installing		equipme nt, and work area.	Installation of DLC	Vnowladza	This unit can be	28
	4.2 Performing PLC programmi ng.	(a) Installing PLC software.	<ul> <li>Internet and Library Search: Guide students to search for relevant information about installing PLC software.</li> <li>ICT-based learning Prepare a video clip showing the basic principles for installing PLC software.</li> <li>Group discussion: Guide students to present what they see in the video clip.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment and safety gear.</li> <li>Read and interpret operating manuals.</li> <li>Read Interpret circuit diagrams.</li> <li>Draw sequential and ladder logic diagrams.</li> <li>Read and interpret ladder programs.</li> <li>Observe safety precautions.</li> <li>Perform</li> </ul>	Installation of PLC software performed according to technical specifications.	<ul> <li>Knowledge</li> <li>evidence:</li> <li>Detailed knowledge</li> <li>of:</li> <li>Method used: The</li> <li>student should</li> <li>explain how to install</li> <li>PLC software.</li> <li>Principles: The</li> <li>student should</li> <li>explain principles</li> <li>related to installing</li> <li>PLC software.</li> <li>Theories: The</li> <li>student should</li> <li>explain: -</li> <li>The types of</li> <li>PLC systems</li> <li>software.</li> <li>Master slave</li> <li>configurations.</li> <li>Ladder</li> <li>programming.</li> <li>Uploading and</li> <li>downloading</li> <li>ladder programs.</li> <li>PLC operations</li> <li>monitoring</li> <li>process.</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>PLC Installation manuals</li> <li>Personal computer</li> <li>PLC programming software</li> <li>Interface cables</li> <li>Ladder programs in soft and hard copies</li> <li>Circuit diagrams</li> <li>Multimeter</li> <li>TTL and CMOS Logic gates</li> <li>I/O Devices</li> <li>Power supply</li> </ul>	28

Module Title	Unit Title	Elements	Sugge	ested Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	Requirements/	of Periods
Competency )	Competen	Activities)	Meth	ods	Assessment	Assessment	Assessment	Suggested	per Unit
	cles)							Resources	
					simulation. • Upload ladder program. • Perform functional tests. • Adjust parameters for optimum performance • Clean tools,		<ul> <li>Sequence operators and function blocks.</li> <li>PLC firmware updates.</li> <li>Electronic devices.</li> <li>Measurements and instrumentation.</li> <li>Circumstantial knowledge: Detailed knowledge about:</li> </ul>		
					equipment,		• Safety		
					and work		precautions while		
					place.		system.		
		(b)	• II	nternet and	The student	Installation of PLC	Knowledge	This unit can be	
		Performing	L	ibrary Search:	should be	system performed	evidence:	achieved at the	
		basic	G	uide students to	able to:	according to technical	Detailed knowledge	workplace or	
		sequence	se	earch for relevant	<ul> <li>Select</li> </ul>	specifications.	of:	training institution.	
		circuits.	ir	nformation about	tools,		Method used: The	The following	
			p	erforming basic	equipment,		student should	tools, safety gear,	
			Se	equence circuits.	and safety		explain how to	and equipment are	
			• I	C <b>T-based</b>	gear.		perform basic	to be available	
			le	earning	• Read		sequence circuits.	• PLC	
			P	repare a video	and interpret		Principles: The	Installation	
			c	lip showing the	operating		student should	manuals	
			b	asic principles of	manuals.		explain principles	<ul> <li>Personal</li> </ul>	
			p	erforming basic	• Read		related to performing	computer	
			Se	equence circuits.	and		basic sequence	PLC	
			• G	froup	iinterpret		circuits.	programming	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	Requirements/	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
			discuss	ion:	circuit		Theories: The	software	
			Guide s	tudents to	diagrams.		student should	Interface cables	
			present	what they	• Draw		explain: -	Ladder	
			see in th	ne video	sequential		• Types of PLC	programs in	
			clip.		and ladder		systems.	soft and hard	
			1		logic		Master slave	copies	
					diagrams.		configurations.	• Circuit	
					• Read		Ladder	diagrams	
					and interpret		programming.	Multimeter	
					ladder		• Uploading and	• TTL and	
					programs.		downloading ladder	CMOS logic	
					Observe		programs.	gates	
					safety		PLC Operations	• I/O devices	
					precautions.		monitoring process.	<ul> <li>Power supply</li> </ul>	
					• Perform		Sequence	· · · · · · · · · · · · · · · · · ·	
					simulation.		operators and		
					• Upload		function blocks.		
					ladder		PLC firmware		
					program.		updates.		
					• Connect		Electronic		
					PLC sensors		devices.		
					and		Measurements		
					actuators.		and instrumentation.		
					• Perform				
					functional		Circumstantial		
					tests.		knowledge:		
					<ul> <li>Adjust</li> </ul>		Detailed knowledge		
					parameters		about:		
					for optimum		Safety		
					performance		precautions while		
					•		installing the PLC		
					• Docume		system.		
					nt the		• Safe handling of		

Module Title	Unit Title	Elements	Suggested Teaching			Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and L Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					installation. • Clean tools, equipment, and the work place.		work tools.		
		(c) Administerin g PLC ladder llogic pprogramme s	<ul> <li>Internet ar Library Se Guide stude search for r informatior administeri ladder llog</li> <li>ICT-based learning Prepare a v clip showin basic princi administeri ladder llog</li> <li>Group discussion: Guide stude present wha see in the v clip.</li> </ul>	nd earch: lents to relevant n about ing PLC gic. 1 video ng the tiples of ing PLC gic . : lents to that they video	The student should be able to: • Select tools, equipment, and safety gear. • Read and interpret operating manuals. • Read and interpret circuit diagrams. • Draw sequential and ladder logic diagrams. • Read and interpret ladder programs. • Observe	Administering PLC ladder logic programme performed according to technical specifications.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how administer PLC ladder logic programme. Principles: The student should explain principles related to administering the PLC ladder logic programme. Theories: The student should explain: - • Types of PLC systems. • Master slave configurations. • Ladder programming.	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available</li> <li>PLC Installation manuals</li> <li>Personal computer</li> <li>PLC programming software</li> <li>Interface cables</li> <li>Ladder programs in soft and hard copies</li> <li>Circuit diagrams</li> <li>Multimeter</li> <li>TTL and CMOS logic</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>safety precautions.</li> <li>Perform simulation.</li> <li>Upload ladder program.</li> <li>Connect PLC sensors and actuators.</li> <li>Perform ance</li> <li>Clean tools, equipment, and the workplace.</li> </ul>		<ul> <li>Uploading and downloading ladder programs.</li> <li>PLC operations monitoring process.</li> <li>Circumstantial knowledge: Detailed knowledge about:</li> <li>Safety precautions while installing the PLC system.</li> </ul>	gates <ul> <li>I/O Devices</li> <li>Power supply</li> </ul>	
		(d) Connecting input and output devices to PLC.	<ul> <li>Internet Library Guide s search f informa connect and out to PLC.</li> <li>ICT-ba learnin Prepare clip sho basic pr connect</li> </ul>	t and y Search: tudents to for relevant tion about ing input put devices sed g a video wing the inciples for ing input	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and safety gear.</li> <li>Read and interpret operating manuals.</li> <li>Read and interpret</li> </ul>	Connection of Input and output devices to the PLC system performed according to technical specifications.	Knowledge evidence: Detailed knowledge of: Method used: The Student should explain how to connect input and output devices to PLC. Principles: The student should explain principles related to connecting	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>PLC installation manuals</li> <li>Personal computer</li> <li>PLC</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	Training	Number	
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods	_	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	_
			and out	put devices	circuit		input and output	programming	
			to PLC.		diagrams.		devices to PLC.	software	
			Group		• Draw		Theories: The trainee	• Interface cables	
			discuss	ion:	sequential		should explain: -	Ladder	
			Guide s	tudents to	and ladder		• The types of	programs in	
			present	what they	logic		PLC systems.	soft and hard	
			see in th	ne video	diagrams.		Master slave	copies	
			clip.		Read		configurations.	• Circuit diagram	
					and interpret		• Ladder	Multimeter	
					ladder		programming.	• TTI and	
					programs.		<ul> <li>Unloading and</li> </ul>	CMOS logic	
					<ul> <li>Observe</li> </ul>		downloading ladder	gates	
					safety		programs	• I/O dovicos	
					precautions		• PLC operations	<ul> <li>I/O devices</li> <li>Dower supply</li> </ul>	
					Perform		monitoring process	• Power suppry	
					simulation		Sequence		
					<ul> <li>Unload</li> </ul>		• Sequence		
					ladder		function blocks		
					program		Circumstantial		
					• Connect		knowledge.		
					PI C sensors		Detailed knowledge		
					and		about.		
					actuators		<ul> <li>Safety</li> </ul>		
					<ul> <li>Perform</li> </ul>		precautions while		
					functional		installing the PLC		
					tests		system		
					• Clean		• Safe handling of		
					tools		work tools		
					equipment		<ul> <li>Plastics and</li> </ul>		
					and the		metal disposal		
					workplace		moun disposa		
					sinpiace.				
		(e)	• Interne	et and	The student	Simulation and	Knowledge	This unit can be	

(Main Competency)(Specific Competencies)(Learning Activities)and MethodsLearning MethodsProcess AssessmentProduct/Service AssessmentKnowledge AssessmentRequirements/ Suggested ResourcesImage: Specific CompetenciesPerforming and factory automation.Elibrary Search: Guide students to search for relevant information about factory automation.should be able to: search for relevant information about performing gear.factory automation.evidence: Detailed knowledge of: to technical specifications.achieved at the workplace or training institution.Image: Specific Competency automation.Image: Specification about factory automation.Read and interpret operating simulation and factory automation.Freque a video clip showing the basic principles for simulation and factory automation.Read and interpret operating manuals.Requirements/ AssessmentRequirements/ Resound to technical specifications.Reidence: Detailed knowledge of: Method used: The student should explain principles: The student should explain principles relating to simulation and factory process. Theories: The student should explain principles relating to simulation and factory process. Theories: The student should explain principles relating to simulation.Image: Ploce relating to simulation and interpret diagrams.Knowledge AssessmentRequirements/ AssessmentImage: Computer with the see in the video clip.Computer with the see in the video clip.Image: Computer the the	Module Title	Training Number	Assessment Criteria			
Competency )Competencies)Activities)MethodsAssessmentAssessmentAssessmentAssessmentSuggested ResourcesCompetency )Competency (iso)Performing simulation and factory automation.Elibrary Search: Guide students to search for relevant information about performing simulation and factory automation.should be able to: obstitution and factory automation.factory automation.evidence: Detailed knowledge of: to technical specifications.achieved at the workplace or the tothical specifications.Image: Competency (iso)Performing simulation and factory automation.Image: Competency (iso) automation.factory automation.factory automation.achieved at the workplace or to technical specifications.Image: Competency (iso)Performing simulation and factory automation.Need and factory automation.Need and interpret operating manuals.factory automation.interpret operating manuals.Principles: The student should explain principles: The student should explain: - operation:PLC programming soft and hard copiesImage: Competency (iso)Group discussion: diagrams.interpret logic coligic diagrams.Nater slave configurations.Competence programming.Image: Competency (iso)Group discussion: diagrams.interpret logic configurations.interpret and ladder logic configurations.interpret programming.interpret configurations.Image: Competency (iso)Frequency	(Main	Requirements/ of Periods	Knowledge			
cies)Performing simulation and factory automation.Library Search: Guide students to search for relevant information about performing simulation and factory automation.Should be able to: ools, equipment, and safety gear.factory automation performing simulation and factory automation.evidence: Detailed knowledge of: Method used: The student should perform simulation and factory automation.achieved at the workplace or training institution.• ICT-based learning Prepare a video clip showing the basic principles for performing simulation and factory automation.• Read and interpret circuit diagrams.evidence: Detailed knowledge of: matoasiton.achieved at the workplace or training institution.• ICT-based learning Prepare a video clip showing the basic principles for performing simulation and factory automation.• Read and interpret circuit diagrams.evidence: performing manuals.evidence: Detailed knowledge of: matoasiton.other is tools, equipment are automation.• Croup discussion: Guide students to present what they see in the video clip.• Read and ladder logicfactory automation.interpret circuit diagrams.evidence: programming. • Types of PLC systems.achieved at the workplace or training institution.• Croup discussion: clip.• Read and ladder logicon interpret diagrams. • Read and ladderevidence: programming. • Undening and configurations.evidence: Detailed knowledge of: The following the <b< th=""><th>Competency )</th><th>Suggested per Unit</th><th>Assessment</th></b<>	Competency )	Suggested per Unit	Assessment			
Performing simulation and factory automation.Library Search: Guide students to search for relevant information about performing simulation and factory automation.should be able to: · Select to technical specifications.factory automation performed according to technical specifications.evidence: Detailed knowledge of: Method used: The student should perform simulation and factory automation.achieved at the workplace or training institution.• ICT-based learning performing simulation and factory automation.• Read and interpret operating manuals.factory automation.evidence: Detailed knowledge of: Method used: The student should explain principles relating to simulation and factory process.achieved at the workplace or training institution.• ICT-based learning performing simulation and factory automation.• Read and interpret operating manuals.explain principles relating to simulation and factory process.• Personal computer• Types of PLC systems. e in the video clip showing the basic principles for performing discussion: Guide students to present what they see in the video clip.• Read and ladder logic• Master slave configurations.• Master slave copies• Ultopading and diagrams. colig students to present what they see in the video clip.• Read and interpret and interpret and interpret logic• Master slave configurations.• Circuit diagrams • Tadder programming. • Ultopading and • Tyte and copies		Resources				
InductPrograms.Observeownloading laddergates• Observe• PLC Operations• I/O devicessafety• PLC Operations• Power supplyprecautions.• Perform• Sequencesimulation.• Operators and• UploadIdder• PLC firmware• PLC firmwareundates• PLC firmware		achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available PLC Installation manuals         • Personal computer         • Personal computer         • PLC programming software         • Interface cables         • Ladder programs in soft and hard copies         • Circuit diagrams         • Multimeter         • TTL and CMOS logic gates         • I/O devices         • Power supply	evidence: Detailed knowledge of: Method used: The student should perform simulation and factory automation. Principles: The student should explain principles relating to simulation and factory process. Theories: The student should explain: - • Types of PLC systems. • Master slave configurations. • Ladder programming. • Uploading and downloading ladder programs. • PLC Operations monitoring process. • Sequence operators and function blocks. • PLC firmware undates			

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>PLC sensors and actuators.</li> <li>Perform functional tests.</li> <li>Adjust parameters for optimum performance</li> <li>Clean tools, equipment, and the workplace.</li> </ul>		<ul> <li>knowledge:</li> <li>Detailed knowledge</li> <li>about: <ul> <li>Safety</li> <li>precautions while</li> <li>installing the PLC</li> <li>system.</li> <li>Safe handling of</li> <li>work tools.</li> <li>Plastics and</li> <li>metal disposal</li> </ul> </li> </ul>		
	4.3 Installing PLC networking and communic ation systems.	(a) Installing PLC communicati on module.	<ul> <li>Internet Librar Guide s search t informa installin commu module</li> <li>ICT-ba learnin Prepare clip sho basic pr installin commu module</li> </ul>	et and y Search: tudents to for relevant tion about g the PLC nication seed g a video wing the rinciples for ng PLC nication	The student should be able to: • Select tools, equipment, and safety gear. • Read and interpret installation manuals. • Read and iinterpret circuit	Installation of PLC communication module performed according to technical specifications.	Knowledge evidence: Detailed knowledge of: Method used: the student should explain how to install the PLC communication module. Principles: The student should explain principles related to installing the PLC communication	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available should be available: - • PLC installation manuals • Personal computer • PLC programming	42

Module Title	Unit Title	Elements	Suggested T	Teaching	Assessment Criteria			Training	Number
(Main	(Specific	(Learning	and L	earning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
			• Group		diagrams.		module.	software	
			discussion	l:	• Read		Theories: The	• Interface cables	
			Guide stud	lents to	and interpret		student should	• Ladder	
			present wh	hat they	ladder		explain: -	programs in	
			see in the v	video	programs.		• Types of PLC	soft and hard	
			cnp.		• Observe		communication and	copies	
					safety		Circumstantial	• Circuit diagram	
					Visually		knowledge•	• Multimeter	
					• Visually		Detailed knowledge	• Precision	
					PLC Unit		about:	screwariver	
					<ul> <li>Install</li> </ul>		• Safety		
					PI C		precautions while		
					communicati		installing the PLC	<ul> <li>SCADA</li> <li>Communicatio</li> </ul>	
					on module.		system.	<ul> <li>Communicatio</li> <li>n modulos</li> </ul>	
							• Safe handling of	Wine string one	
							work tools.	<ul> <li>Wire surppers</li> <li>Dressurized</li> </ul>	
								cleaners	
								<ul> <li>Crimping tools</li> </ul>	
								<ul> <li>Crimping tools</li> <li>Magnifying</li> </ul>	
								- magninying olasses	
								• Safety goggle	
								<ul> <li>Soldering gun</li> </ul>	
								<ul> <li>Hot air gun</li> </ul>	
								• Air blower	
								Overall/Overco	
								at	
								• Safety Boots	
		(b) Installing	<ul> <li>Internet a</li> </ul>	nd	The student	Installation and	Knowledge	This unit can be	
		and	Library S	earch.	should be	integration of HMI	evidence:	achieved at the	
		integrating	Guide stud	lents to	able to:	line for PLC system	Detailed knowledge	workplace or	

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
		Human Machine Interface (HMI) line for PLC.	<ul> <li>search for relevant information about installing and integrating the Human Machine Interface (HMI) line for PLC.</li> <li>ICT-based learning Prepare a video clip showing the basic principles for installing and integrating Human Machine Interface (HMI) line for PLC.</li> <li>Group discussion: Guide students to present what they see in the video clip.</li> </ul>	<ul> <li>Select tools, equipment, and safety gear.</li> <li>Read and interpret installation manuals.</li> <li>Read and interpret circuit diagrams.</li> <li>Read and interpret ladder programs.</li> <li>Observe safety precautions.</li> <li>Visually inspect the PLC Unit.</li> <li>Install PLC communicati on module.</li> </ul>	performed according to technical specifications.	of: Method used: the student should explain how Human machine interface (HMI) line for PLC. Principles: The student should explain the principles related to installing and integrating Human Machine Interface (HMI) line for PLC. Theories: The student should explain: - • Types of PLC communication and monitoring systems. Circumstantial knowledge: Detailed knowledge about: • Safety precautions while installing the PLC system. • Safe handling of work tools.	training institution. The following tools, safety gear, and equipment are to be available should be available: • PLC installation manuals • Personal computer • PLC programming software • Interface cables • Ladder programs in soft and hard copies • Circuit diagrams • Multimeter • Precision screwdriver sets • HIM • SCADA • Communicatio n modules • Wire strippers • Pressurized contact cleaners	

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
							<ul> <li>Crimping tools</li> <li>Magnifying glasses</li> <li>Safety goggles</li> <li>Soldering gun</li> <li>Disordering pumps</li> <li>Hot air gun</li> <li>Air blower</li> <li>Overall/Overco at</li> <li>Safety Boots</li> </ul>	
		(c) Connect PLC to Supervisory Control and Data Acquisition.	<ul> <li>Internet and Library Search: Guide students to search for relevant information about Connect PLC to Supervisory Control and Data Acquisition.</li> <li>ICT-based learning Prepare a video clip showing the basic principles for Connecting PLC to Supervisory Control and Data Acquisition.</li> <li>Group discussion: Guide students to</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and safety gear.</li> <li>Read and interpret installation manuals.</li> <li>Read and interpret circuit diagrams.</li> <li>Read and interpret ladder programs.</li> </ul>	Connection of PLC SCADA performed according to technical specifications.	Knowledge evidence: Detailed knowledge of: The method used: the student should explain how to connect PLC to SCADA. Principles: The student should explain principles related to connecting PLC SCADA. Theories: The student should explain: - • Types of PLC communication and monitoring systems. Circumstantial	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available</li> <li>PLC installation manuals</li> <li>Personal computer</li> <li>PLC programming software</li> <li>Interface cables</li> <li>Ladder programs in soft and hard copies</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
			present v	what they	• Observe		knowledge:	<ul> <li>Circuit</li> </ul>	
			see in the	e video	safety		Detailed knowledge	diagrams	
			clip.		precautions.		about:	Multimeter	
					<ul> <li>Visually</li> </ul>		• Safety	<ul> <li>precision</li> </ul>	
					inspect the		precautions while	screwdriver	
					PLC Unit.		installing the PLC	sets	
					<ul> <li>Install</li> </ul>		system.	• HIM	
					PLC		• Safe handling of	• SCADA	
					communicati		work tools.	Communicatio	
					on module.			n modules	
								<ul> <li>Wire strippers</li> </ul>	
								<ul> <li>Pressurized</li> </ul>	
								contact	
								cleaners	
								Crimping tools	
								<ul> <li>Magnifying</li> </ul>	
								glasses	
								• Safety goggles	
								<ul> <li>Soldering gun</li> </ul>	
								<ul> <li>Disordering</li> </ul>	
								pumps	
								• Hot air gun	
								• Air blow	
								Overcoat	
								Safety Boots	
	4.4	(a)Installing	Internet	and	The student	Simple lift system	Knowledge	This unit can be	42
	Installing	simple Lift	Library	Search:	should be	runs as per technical	evidence:	achieved at the	
	lift and	system	Guide st	udents to	able to:	specifications and	Detailed knowledge	workplace or	
	escalator		search fo	or relevant	• Select	IEE Regulations.	of:	training institution.	
	systems		informat	ion about	tools,		The method used:	The following	
			installing	g simple	equipment,		The student should	tools, safety gear,	
			lift syste	m.	and safety		explain how to install	and equipment are	
							simple lift system.	to be available	

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and Learning	Process	Product/Service	Knowledge	Requirements/	of Periods
Competency )	Competen	Activities)	Methods	Assessment	Assessment	Assessment	Suggested	per Unit
	cles)						Kesources	
			<ul> <li>ICT-based learning Prepare a video clip showing the basic principles for installing a simple lift system, and installing PLC components/access ories.</li> <li>Group discussion: Guide students to present what they see in the video clip.</li> </ul>	<ul> <li>gear.</li> <li>Interpret circuit diagrams.</li> <li>Design lift protocols.</li> <li>Fix elevator track.</li> <li>Constru ct prototype elevator.</li> <li>Make electrical connections.</li> <li>Run prototype lift.</li> <li>Observe safety precautions.</li> <li>Clean tools, equipment, and work area.</li> <li>Store tools, equipment and safety gear.</li> </ul>		<ul> <li>Principles: The student should explain principles related to installing simple lift system.</li> <li>Theories: The student should explain: <ul> <li>Functioning of BS2 controller.</li> <li>Functions of various actuators and sensors.</li> <li>Feedback systems.</li> <li>User interface hardware.</li> <li>Status indication.</li> </ul> </li> <li>Circumstantial knowledge Detailed knowledge Detailed knowledge about: <ul> <li>Safety precaution .</li> </ul> </li> </ul>	<ul> <li>Electrician's tool kit</li> <li>Power hand drill</li> <li>Elevator track</li> <li>Elevator box</li> <li>Sliding door</li> <li>Servo motor</li> <li>Continuous motor</li> <li>Continuous motor</li> <li>Electronic components</li> <li>BS2 controller</li> <li>Desktop computer and printer</li> <li>Design software</li> <li>PLC with software</li> <li>Multimeter</li> <li>Clamp-on ammeter</li> </ul>	

Module Title	Unit Title	Elements	Suggested Teaching			Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	Requirements/	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
		(b) Installing simple escalator systems.	<ul> <li>Intern Librar Guide search inform installi escalat</li> <li>ICT-ba learnin Prepara clip she basic p installi escalat</li> <li>Group discuss Guide present see in t clip.</li> </ul>	et and y Search: students to for relevant ation about ng a simple or system. ased bg e a video owing the rinciples of ng an or system. students to what they he video	The student should be able to: • Select tools, equipment, and safety gear. • Interpret circuit diagrams. • Design escalator protocols. • Fix escalator. • Constru ct prototype escalator. • Make electrical connections. • Run prototype escalator. • Observe safety precautions. • Clean tools, equipment, and work area.	Simple escalator system runs as per technical specifications and IEE Regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>The method used: the student should explain how to install a simple lift system.</li> <li>Principles: The student should explain the principles related to installing a simple lift system.</li> <li>Theories: The student should explain:</li> <li>The functions of BS2 controller.</li> <li>The functions of various actuators and sensors.</li> <li>The feedback systems.</li> <li>User interface hardware.</li> <li>Status indication.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precaution</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Electrician's tool kit</li> <li>Power hand drill</li> <li>Escalator track</li> <li>Escalator track</li> <li>Escalator box</li> <li>Sliding door</li> <li>Servo motor</li> <li>Continuous motor</li> <li>Electronic components</li> <li>Video clip</li> <li>Projector</li> <li>Desktop computer and printer</li> <li>Design software</li> <li>PLC with software</li> <li>Multimeter</li> <li>Clamp-on ammeter</li> </ul>	

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	Training	Number	
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
				• Store tools, equipment, and safety gear.				
		(c) Installing a three-stage conveyor belt drive and monitoring system.	<ul> <li>Internet and Library Search: Guide students to search for relevant information about installing a three- stage conveyor belt drive and monitoring system.</li> <li>ICT-based learning</li> <li>Prepare a video clip showing the basic principles for installing a three- stage conveyor belt drive and monitoring system.</li> <li>Group discussion: Guide students to present what they see in the video clip.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Select tools, equipment, and safety gear.</li> <li>Interpret circuit diagrams.</li> <li>Design conveyor belt drive protocols.</li> <li>Fix conveyor belt drive.</li> <li>Make electrical connections.</li> <li>Run prototype conveyor belt drive.</li> <li>Observe safety</li> </ul>	Three-stage conveyor belt drive and monitoring system runs as per technical specifications and IEE Regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>The method used:</li> <li>The student should explain how to install a three-stage conveyor belt drive and monitoring system.</li> <li>Principles: The student should explain the principles related to installing a three-phase conveyor belt drive and monitoring system.</li> <li>Theories: The student should explain:</li> <li>The functions of BS2 controller.</li> <li>The functions of various actuators and sensors.</li> <li>Feedback</li> </ul>	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available</li> <li>Electrician's tool kit</li> <li>Power hand drill</li> <li>Three-stage conveyor belt drive and monitoring system track</li> <li>Three-stage conveyor belt drive and monitoring system track</li> <li>Shiding door</li> <li>Servo motor</li> <li>Continuous motor</li> <li>BS2 controller</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	Training	Number	
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>precautions.</li> <li>Clean tools, equipment, and work area.</li> <li>Store tools, equipment, and safety gear.</li> </ul>		<ul> <li>systems.</li> <li>User interface hardware.</li> <li>Status indication.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safety precaution</li> </ul>	<ul> <li>Desktop computer and printer</li> <li>Design software</li> <li>PLC with software</li> <li>Multimeter</li> <li>Clamp-on ammeter</li> </ul>	
5.0 Managing resources.	5.1 Establishin g tools, equipment, and material profile.	(a) Preparation of tools, equipment, and materials database using ledger books	<ul> <li>Brainsto Guide th to define Ledger b</li> <li>Practica Guide th to identified equipme materials</li> <li>Activity the stude groups to tools, equipant database ledger bo</li> </ul>	orm: e student the ook. <b>I work:</b> e student by tools, nt, and s. : Arrange ents in oprepare uipment, crials using ooks.	<ul> <li>The student should be able to:</li> <li>List tools and equipment for a specific job.</li> <li>Enter the task in one column and enter the required tools and equipment in the next column.</li> <li>Add a third column to indicate quantity.</li> </ul>	Tools, equipment, and materials profile handbooks produced as a reference for electricians as per catalog manual specifications.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to prepare a list of tools and equipment for a database requirement. Principles: The student should explain the principles relateed to preparing tools, equipment, and materials database using ledger books. Theories: The student should explain the importance of making	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available</li> <li>Computer</li> <li>Tools and equipment catalogue</li> <li>Stationeries</li> <li>Scientific calculator</li> <li>Staple machine</li> <li>Overcoat</li> </ul>	15

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>List materials for a specific task in a requisition form.</li> <li>Catalog ue the data as a reference tool and equipment profile sourcebook.</li> <li>Prepare database using a computer.</li> </ul>		<ul> <li>a standard reference data book of tools required for various electrical tasks.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about:</li> <li>Safe handling of standard reference data book of tools and equipment.</li> </ul>		
		(b) Preparing e tools, equipment, and materials database using a computer	<ul> <li>Brainsto Guide th to define materials</li> <li>Practica Guide th to identifie equipme materials database</li> <li>Activity the stude groups to tools, eq and mate</li> </ul>	orm: e student the s database. d work: e student fy tools, nt, and s s. : Arrange ents in o tprepare uipment, erials	<ul> <li>The student</li> <li>should be</li> <li>able to: <ul> <li>List</li> <li>List</li> <li>tools and</li> <li>equipment</li> <li>for a specific</li> <li>job.</li> <li>Enter</li> <li>the task in</li> <li>one column,</li> <li>and enter the</li> <li>required</li> <li>tools and</li> <li>equipment in</li> </ul></li></ul>	Tools, equipment, and materials profile handbooks produced as a reference for electricians as per catalogue manual specifications.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to establish a list of tools and equipment for preparing a database. Principles: The student should explain the principles related to the	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available</li> <li>Computer</li> <li>Tools and equipment catalogue</li> <li>Stationeries</li> <li>Scientific</li> </ul>	
Module Title	Unit Title	Elements	Suggested	Teaching	g Assessment Criteria			Training	Number
-----------------------	--	--	---	---	--	---	--	--	------------------------
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
			databas comput	e using a er.	the next column. • Add a third column to indicate quantity. • List materials for a specific task in a requisition form. • Catalog ue the data as reference tools and equipment profile sourcebook. • Prepare database using a computer		<ul> <li>preparation of tools, equipment, and materials database using a computer.</li> <li>Theories: The student should explain the importance of making a standard reference data book of tools required for various electrical tasks.</li> <li>Circumstantial knowledge Detailed knowledge about:</li> <li>Safe handling of a standard reference data book of tools and equipment.</li> </ul>	<ul><li>calculator</li><li>Staple machine</li><li>Overcoat</li></ul>	
	5.2 Planning for Maintenan ce.	(a) Planning Machine Maintenance	<ul> <li>Brainst Guide ti to defin mainter</li> <li>Practic Guide ti to ident types of mainter</li> <li>Activity</li> </ul>	torm: the student the machine the machine the student the student the firm the firm the fir	The student should be able to: • Use the manual to write the machine datasheet. • Write simple and	Machine maintenance is planned as per activities.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to plan the machine maintenance programme.	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Skills logbook</li> <li>Tools and</li> </ul>	23

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods	_	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	_
			the stud	ents in	effective		Principles: The	equipment	
			groups	to plan for	user		student should	catalogue	
			machine	e	instructions.		explain the principles	<ul> <li>Stationeries</li> </ul>	
			mainten	ance.	• Issue		relating to planning	<ul> <li>Scientific</li> </ul>	
					the		machine	calculator	
					instructions		maintenance.	• Staple machine	
					to the user		Theories: The	• Overcoat	
					and		student should	Helmet	
					emphasize		explain:		
					their		<ul> <li>How to plan</li> </ul>		
					importance.		machine		
					• Identify		maintenance?		
					the available		Circumstantial		
					maintenance		knowledge		
					work.		Detailed knowledge		
					• Include		about:		
					all facilities		• The importance of		
					in the		feedback information		
					program				
					without				
					omission.				
					<ul> <li>Prepare</li> </ul>				
					a realistic				
					budget.				
					• Use				
					code in				
					maintenance				
					planning.				
					• Distribu				
					te				
					maintenance				
					workload				
					events.				

Module Title	Unit Title	Elements	Sug	Suggested Teaching		Assessment Criteria			Training	Number
(Main	(Specific	(Learning	and	Ĩ	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Me	thods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)								Resources	
		(b) Planning	•	Brainst	orm:	The student	Building maintenance	Knowledge	This unit can be	
		building		Guide th	ne student	should be	programme planned	evidence:	achieved at the	
		maintenance		to defin	e the	able to:	as per activities.	Detailed knowledge	workplace or	
		programme.		building	5	• Use the		of:	training institution.	
				mainten	ance	manual to		Method used: The	The following	
				program	nme.	write the		student should	tools, safety gear,	
			•	Practic	al work:	machine		explain now to plan a	to be evolution and	
				Guide th	he student	datasheet.		program	o Shrilla laghaalt	
				to ident	ity types of	• write		<b>Princinles</b> . The	<ul> <li>Skills logbook.</li> <li>Tools and</li> </ul>	
				building	,	simple and		student should	• Tools and	
				nrogran				explain the principles	catalogue	
				Activity	Arrango	instructions		related to the	• Stationarias	
			•	the stud	onts in			planning of building	Stationeries	
				grouns f	to plan for	the		maintenance	• Scientific	
				the build	ding	instructions		programmes.	Staple machine	
				mainten	ance	to the user		Theories: The	Overcoat	
				program	nme.	and		student should	• Overcoat	
				1 0		emphasize		explain:		
						their		<ul> <li>How to plan to</li> </ul>		
						importance.		build a maintenance		
						• Identify		programme.		
						maintenance		Circumstantial		
						work		knowledge		
						available.		Detailed knowledge		
						• Include		about:		
						all facilities		• Importance of		
						in the		reedback information		
						program				
						without				
						omission.				
						• Prepare				
						a realistic				

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
				<ul> <li>budget.</li> <li>Use</li> <li>code in</li> <li>maintenance</li> <li>planning.</li> <li>Distribute</li> <li>maintenance</li> <li>workload</li> <li>events.</li> </ul>				
		(c) Organising human resource requirement.	<ul> <li>Brainstorm: Guide the student to define human resources.</li> <li>Practical work: Guide the student on how to organise human resource requirements maintenance.</li> <li>Activity: Arrange the students in groups to plan for machine maintenance.</li> </ul>	<ul> <li>The student should be able to:</li> <li>Use the manual to write the machine datasheet.</li> <li>Write simple and effective user instructions.</li> <li>Issue the instructions to the user and emphasisze their importance.</li> <li>Identify available maintenance</li> </ul>	Human resource requirements are organised as per activities.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to organise human resource requirements. Principles: The student should explain the principles related to organising human resource requirements. Theories: The student should explain: How to organise human resource requirements. Circumstantial knowledge Detailed knowledge	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available e:</li> <li>Skills logbook</li> <li>Tools and equipment catalogue</li> <li>Stationeries</li> <li>Scientific calculator</li> <li>Staple machine</li> <li>Overcoat</li> <li>Helmet</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested	of Periods per Unit
1 0 /	cies)	,						Resources	•
					the works.		about:		
					• Include		• The importance of		
					all facilities		feedback information		
					in the				
					programme				
					omission				
					oninssion.				
					• Flepale				
					budget				
					• Use				
					code in				
					maintenance				
					planning.				
					• Distribu				
					te				
					maintenance				
					workload				
					events.				
		(d)	Brains	torm:	The student	Maintenance	Knowledge	This unit can be	
		Controlling	Guide t	he student	should be	functions are	evidence:	achieved at the	
		maintenance	to defin	e control of	able to:	controlled as per	Detailed knowledge	workplace or	
		functions.	mainter	nance	• Use the	activities.	of:	training institution.	
			functio	n.	manual to		Method used: The	The following	
			Practic	al work:	write the		student should	tools, safety gear,	
			Guide t	he student	machine		explain now to	to be evoilable	
			how to	control	uatasneet.		functions	should be available:	
			function	lance	• write		Principles. The	Skills logbook	
					effective		student should	<ul> <li>Tools and</li> </ul>	
			<ul> <li>Activit</li> <li>Arron</li> </ul>	y: natha	user		explain the principles	equipment	
			student	s to plan	instructions		related to controlling	catalogue	
			for cco	ntrolling	• Issue		maintenance	Stationeries	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
			mainte functio	nance ns.	the instructions to the user and emphasisze their importance. • Identify the available maintenance work. • Include all facilities in the programme without omission. • Prepare a realistic budget. • Use code in maintenance planning. • Distribu te maintenance workload events.		<ul> <li>functions.</li> <li>Theories: The student should explain:</li> <li>The importance of controlling maintenance functions.</li> <li>Circumstantial knowledge Detailed knowledge about:</li> <li>The importance of feedback information</li> </ul>	<ul> <li>Scientific calculator</li> <li>Staple machine</li> <li>Overcoat</li> </ul>	
	5.3	(a) Preparing	Brains	torm:	The student	The materials and	Knowledge	This unit can be	23
	Estimating	eelectrical	Guide	the student	should be	labour cost estimate	evidence:	achieved at the	
	material	installation	to prep	are	able to:	conform to the	Detailed knowledge	workplace or	
	and labour	drawings.	electri	cal	• Interpret	installation layout	of:	training institution.	

Module Title	Unit Title	Elements	Suggested Teaching	g Assessment Criteria			Training	Number
(Main	(Specific	(Learning	and Learning	Process	Product/Service	Knowledge	Requirements/	of Periods
Competency )	Competen	Activities)	Methods	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)						Resources	
	costs.	(c) Carrying	<ul> <li>installation drawing.</li> <li>Practical work: Guide the student to identify the importance of electrical installation drawings.</li> <li>Activity: Arrangethe students in groups to prepare electrical installation drawings.</li> </ul>	<ul> <li>the drawing.</li> <li>Identify tools, equipment, safety gear, and required materials.</li> <li>Prepare technical specification s.</li> <li>Prepare bills of quantities (BoQ).</li> <li>Prepare cost estimates for materials.</li> <li>Prepare labour costs including other overheads.</li> <li>Clean the work area.</li> </ul>	plan and costing procedures.	Method used: The student should explain how to: prepare electrical installation drawings. Principles: The student should explain the principles relating to the preparation of electrical installation drawings. Theories: The student should explain: • The importance of the functional diagram of each circuit. • The importance of estimating materials and labour costs. Circumstantial knowledge Detailed knowledge about: • Precautions on calculating profit margin.	<ul> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Installation lay out plan</li> <li>Stationeries</li> <li>Scientific calculator</li> <li>Staple machine</li> <li>Unit prices of the materials</li> <li>Overcoat</li> <li>Safety boots</li> </ul>	
		out the	Guide the student	should be	labour cost estimate	evidence:	achieved at the	
		electrical	to define electrical	able to:	conform to the	Detailed knowledge	workplace or	

Module Title	Unit Title	Elements	Suggested Teaching	g Assessment Criteria			Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
		estimate.	<ul> <li>estimation.</li> <li>Practical work: Guide the student to carry out the electrical estimate.</li> <li>Activity: Arrange the students in groups to carry out the electrical estimate.</li> </ul>	<ul> <li>Interpret the drawing.</li> <li>Identify tools, equipment, safety gear, and required materials.</li> <li>Prepare technical specification s.</li> <li>Prepare bills of quantities (BoQ).</li> <li>Prepare cost estimates for materials.</li> <li>Prepare labour costs including other overheads.</li> <li>Clean the work area.</li> </ul>	installation layout plan and costing procedures.	<ul> <li>of: Method used: The student should explain how to carry out electrical estimation.</li> <li>Principles: The student should explain the principles related to carrying out electrical estimation.</li> <li>Theories: The student should explain:</li> <li>The importance of estimating materials and labour costs.</li> <li>Circumstantial knowledge Detailed knowledge about:</li> <li>Precautions on calculating profit margin.</li> </ul>	<ul> <li>training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Installation layout plan</li> <li>Stationeries</li> <li>Scientific calculator</li> <li>Staple machine</li> <li>Unit prices of the materials</li> <li>Overcoat</li> <li>Safety boots</li> </ul>	
	5.4 Preparing a small-scale tender	(a) Producing installation report.	• <b>Brainstorm:</b> Guide the student to define the installation report.	The student should be able to: • Prepare	An installation report document is prepared with all contents.	Knowledge evidence: Detailed knowledge of:	This unit can be achieved at the workplace or training institution.	23

Module Title	Unit Title	Elements	Suggested	Suggested Teaching		g Assessment Criteria			Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods	_	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	_
	document.		Practical wo	ork: Guide	an electrical		Method used: The	The following	
			the student o	on how to	layout		student should	tools, safety gear,	
			produce the		drawing.		explain how to	and equipment are	
			installation		<ul> <li>Prepare</li> </ul>		produce an	to be available	
			report.		technical		installation report.	<ul> <li>Stationeries</li> </ul>	
			Activity	Arrange	specification		• Prepare short a	• Staple machine	
			the stude	ents in	s of the		report.	• Electrical	
			groups t	o produce	materials.		• Principles: The	plan(layout)	
			an instal	llation	<ul> <li>Prepare</li> </ul>		student should	• Schematic	
			report.		bills of		explain the principles	wiring diagram	
					quantities		relating to the	Material	
					(BoQs) for		preparation of the	brochures	
					the tender.		installation report.	Overcoat	
					<ul> <li>Prepare</li> </ul>		Theories: The	<ul> <li>Safety boots</li> </ul>	
					related		student should	<ul> <li>Safety gloves</li> </ul>	
					documents		explain how to	Salety Broves	
					(Instructions		produce installation		
					for		report.		
					tenderers,		Circumstantial		
					special		knowledge		
					contract		Detailed knowledge		
					conditions).		about: The		
					• Prepare		confidentiality of the		
					brochures of		tender document.		
					the				
					identified				
					material.				
					• Bind the				
					document.				
					Cross-				
					check the				
					contents of				
					the tender				

Module Title	Unit Title	Elements	Suggested Teaching			Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and I Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
	cies)	(b) Producing a bill of quantities.	<ul> <li>Brainstorn Guide the st to define th quantities.</li> <li>Practical v Guide the show to pre bill of quant</li> <li>Activity: A the student groups for purpose of producing quantities.</li> </ul>	m: student he bill of work: student epare the ntities. Arrange ts in r the f bill of	Assessment document. The student should be able to: • Prepare electrical layout drawing. • Prepare technical specification s of the materials. • Prepare bills of quantities (BoQ) for the tender. • Prepare related documents (Instructions for tenderers, and special contract conditions). • Prepare	Assessment A tender and a bill of quantities documents are prepared with all contents.	AssessmentKnowledge evidence:Detailed knowledge of:Method used: The student should explain how to produce a bill of quantities.Principles: The student should explain the principles relating to producing a bill of quantities document.Theories: The student should explain: The difference between short-listed tender.Application of the short-listed and open tenders.Circumstantial knowledge	Suggested         Resources         This unit can be         achieved at the         workplace or         training institution.         The following         tools, safety gear,         and equipment are         to be available         • Stationeries         • Staple machine         • Electrical plan- layout         • Schematic wiring diagram         • Brochures of materials         • Overcoat         • Safety boots         • Safety gloves	
					brochures of the identified material. • Bind the		Detailed knowledge about: The confidentiality of the tender document.		

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
	cies) 5.5 Training subordinat es on the job.	(a) Preparing report and training needs for others.	<ul> <li>Brainstorm: Guide the student to define the training report.</li> <li>Practical work: Guide the student to prepare report and training needs for subordinates.</li> <li>Activity: Arrange the students in groups to prepare report and training needs for others.</li> </ul>	document. Cro ss-check the contents of the tender document. The student should be able to: Prepare a capability chart of the subordinates Identify knowledge and skills to be imparted. Identify previous knowledge and skills possessed by	• A training programme properly prepared and presented. A person trained is able to execute tasks to the required standards according to regulations.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to prepare reports and training needs for others. Principles: The trainee should explain the principles related to preparing a report. Theories: The student should explain:	Resources This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available • Writing pads • Safety boots • Safety gloves • Overcoat	18
				<ul> <li>the person to be trained.</li> <li>Prepare a training programme for the subordinate.</li> <li>Carry out the training</li> </ul>		<ul> <li>The necessity of identifying previous knowledge and skills of the person to be trained.</li> <li>The importance of step-by-step guidance from simple to complex tasks.</li> <li>Circumstantial</li> </ul>		

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>programme</li> <li>by using a</li> <li>steps plan</li> <li>(prepare,</li> <li>present, try</li> <li>out, assign</li> <li>work).</li> <li>Continu</li> <li>ally assess</li> <li>the progress</li> <li>of the</li> <li>trainee.</li> <li>Make</li> <li>necessary</li> <li>adjustments</li> <li>to the</li> <li>training</li> <li>programme</li> <li>schedule.</li> </ul>		<ul> <li>knowledge</li> <li>Detailed knowledge</li> <li>about: <ul> <li>The skills of the</li> <li>person to be trained.</li> </ul> </li> <li>Basic</li> <li>educational</li> <li>psychology</li> </ul>		
		(b) Implementin g a prepared training programme.	<ul> <li>Brainst Guide t to defin training program</li> <li>Practic Guide t in imple the prep training program</li> <li>Activity the stud groups</li> </ul>	orm: he student e the al work: he student menting ared hme. y: Arrange ents in for	The student should be able to: • Prepare a capability chart of the subordinates · • Identify knowledge and skills to be imparted. • Identify previous	• A training programme properly prepared and presented. A trained person is able to execute tasks to the required standards according to regulations.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to implement a prepared training programme. Principles: The student should explain the principles related to implementing a	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Writing pads</li> <li>Safety boots</li> <li>Safety gloves</li> <li>Overcoat</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Cri	teria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	<b>Product/Service</b>	Knowledge	<b>Requirements/</b>	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
					1 1. 1		· · · · · · · · · · · · · · · · · · ·		
			implen	lenting a	knowledge		training programme.		
			prepare	u training	and skills		incories: The		
			program	inne.	the person to		student should		
					the person to		explain.		
					De trained.		• Necessity of		
					• Prepare		Identifying previous		
							sof the nervon to he		
					for the		of the person to be		
					subordinata		The importance		
					Suborumate.		• The importance		
					• Cally		of step-by-step		
					training		to complex tasks		
					programme		Circumstantial		
					by using a		knowledge		
					stens plan		Detailed knowledge		
					(prepare		about.		
					prepare,		• The skills of the		
					out assign		person to be trained		
					work).		Basic		
					• Continu		educational		
					ally assess		psychology		
					the progress		psychology.		
					of the				
					trainee.				
					• Make				
					necessary				
					adjustments				
					to the				
					training				
					programme				
					schedule.				
	5.6	(a) Preparing	Brainst	orm:	The student	• Signed jobs are	Knowledge	This unit can be	22

Module Title	Unit Title	Elements	Suggested Teaching			Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
	Supervisin g subordinat es	motivation scheme	<ul> <li>Guide the to define motivation scheme.</li> <li>Practice Guide the to idention types of motivation schemes.</li> <li>Activity the stude groups the motivation scheme.</li> </ul>	he student e the ion al work: he student ify the ion s. v: Arrange ents in to prepare a ion	<ul> <li>should be able to:</li> <li>Maintai n discipline and keep control over the</li> <li>Distribu</li> <li>te work among the workers to</li> <li>yield maximum output.</li> <li>Keep coordination among the staff at</li> <li>various levels.</li> <li>Improve efficiency sincemanage ment keeps sufficient</li> <li>watch and strict inspection.</li> <li>Suggest new ideas and improvemen</li> </ul>	<ul> <li>done according to specifications and schedule.</li> <li>Records of work progress are properly kept.</li> <li>Reports submitted as per regulations.</li> </ul>	<ul> <li>evidence: Detailed knowledge of: Method used: The student should explain how to prepare a motivation scheme.</li> <li>Principles: The student should explain the principles related to preparation of motivation scheme.</li> <li>Theories: The student should explain:</li> <li>Types of management objectives.</li> <li>Managerial abilities.</li> <li>Circumstantial knowledge Detailed knowledge about:</li> <li>Local cultural norms and social behaviour.</li> <li>Leadership/mana gement styles.</li> <li>Basic knowledge</li> </ul>	<ul> <li>achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Job cards</li> <li>Work schedule sheets</li> <li>Drawing facilities</li> <li>Plan layout</li> <li>Overcoat</li> <li>Helmet</li> <li>Safety boots</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>Arrange for the efficient storing and recording.</li> <li>Arrange payments and their record.</li> <li>Impart the instructions timely and provide consistent guidance.</li> <li>Provide facilities and wages to the workers.</li> </ul>		of industrial psychology, and supervision skills.		
		(b) Preparing and organising the work schedule.	<ul> <li>Brains Guide to defin schedu</li> <li>Practic Guide on how and org work s</li> <li>Activity the stu- groups</li> </ul>	torm: the student he work le. cal work: the student to prepare ganise a chedule. y: Arrange dents in to prepare	<ul> <li>The student should be able to:</li> <li>Maintai n discipline and keep control over the employees.</li> <li>Distribu te work among the</li> </ul>	<ul> <li>Signed jobs are done to specifications and according to schedule.</li> <li>Records of work progress are properly kept.</li> <li>Reports submitted as per regulations.</li> </ul>	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to prepare and organise the work schedule. Principles: The student should explain the principles	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Job cards</li> <li>Work schedule sheets</li> <li>Drawing</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching	Assessment Criteria			Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
			and orga	anise the	workers to		related to the	facilities	
			work sc	hedule.	secure		preparation and	<ul> <li>Plan layout</li> </ul>	
					maximum		organisation of work	<ul> <li>Overcoat</li> </ul>	
					output.		schedule.	• Helmet	
					<ul> <li>Keep</li> </ul>		Theories: The	<ul> <li>Safety boots</li> </ul>	
					coordination		student should	5	
					among the		explain:		
					staff at		• The types of		
					various		management		
					levels.		objectives.		
					<ul> <li>Improve</li> </ul>		<ul> <li>Managerial</li> </ul>		
					efficiency		abilities.		
					since		Circumstantial		
					management		knowledge		
					keeps		Detailed knowledge		
					sufficient		about:		
					watch and		<ul> <li>Local cultural</li> </ul>		
					strict		norms and social		
					inspection.		behaviour.		
					<ul> <li>Suggest</li> </ul>		<ul> <li>Leadership/mana</li> </ul>		
					new ideas		gement styles.		
					and		<ul> <li>Basic knowledge</li> </ul>		
					improvemen		of industrial		
					ts.		psychology, and		
					• Arrange		supervision skills.		
					for the				
					efficient				
					storing and				
					recording.				
					• Arrange				
					payments				
					and their				
					record.				

Module Title	Unit Title	Elements	Suggested	Teaching	ning Assessment Criteria			Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
		(c) Assessing work performance	<ul> <li>Brainster Guide the to define perform.</li> <li>Practica Guide the to identi important assession perform.</li> <li>Activity the stude groups te their wo perform.</li> </ul>	orm: ne student e work ance. al work: ne student fy the nce of g work ance. ': Arrange ents in o assess rk ance.	<ul> <li>Impart the instructions timely and provide consistent guidance.</li> <li>Provide facilities and wages to the workers.</li> <li>The student should be able to:         <ul> <li>Maintai n discipline and keep control over the employees.</li> <li>Distribu te work among the workers in order to secure maximum output.</li> <li>Keep coordination among the staff at</li> </ul> </li> </ul>	<ul> <li>Signed jobs are done according to specifications and to schedule.</li> <li>Records of work progress are properly kept.</li> <li>Reports submitted as per regulations.</li> </ul>	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to assess work performance. Principles: The student should explain the principles related to assessing work performance. Theories: The student should explain: • The types of management objectives. • The managerial abilities.	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Job cards • Work schedule sheets • Drawing facilities • Plan layout • Overcoat • Helmet • Safety boots	
					various		Circumstantial		

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>Improve efficiency since management keeps sufficient watch and strict inspection.</li> <li>Suggest new ideas and improvemen ts.</li> <li>Arrange for efficient storing and recording.</li> <li>Arrange for payments and their record.</li> <li>Impart the instructions timely and provide consistent guidance.</li> <li>Provide facilities and wages to the</li> </ul>		<ul> <li>knowledge</li> <li>Detailed knowledge</li> <li>about: <ul> <li>Local cultural</li> <li>norms and social</li> <li>behaviour.</li> <li>Leadership/mana</li> <li>gement styles.</li> <li>Basic knowledge</li> <li>of industrial</li> <li>psychology, and</li> <li>supervision skills.</li> </ul> </li> </ul>		

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
				workers.				
6.0 Managing safe work environment.	6.1 Managing hazards.	(a) Controlling mechanical hazards.	<ul> <li>Guest Speaker: Invite a speaker from OSHA to explain to the student about the control of mechanical hazards.</li> <li>Internet and Library Search: Guide the students to search for relevant information about the control of mechanical hazards.</li> <li>Group discussion: Guide students to present their report on the control of mechanical hazards.</li> </ul>	The student should be able to: • Inte rpret service manuals. • Use OSHA rules and regulations. • Pre pare workshop inspection report. • Pre pare workshop colour code and safety signs. • Ide ntify any safety hazard materials. • Han dle hazardous materials. • Ide ntify and	Hazards, risks, incidents and accidents are managed according to OSHA's rules and regulations.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to control mechanical hazards. Principles: The student should explain the principles related to the control of mechanical hazards. Theories: The student should explain: - • The importance of monitoring safety at working place. Circumstantial knowledge Detailed knowledge about: • Safety precautions while managing hazards. • Safe handling of tools and	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available</li> <li>Electrical equipment</li> <li>Mechanical equipment</li> <li>First aid kit</li> <li>Fire extinguishers</li> <li>Service manuals</li> <li>OSHA rules and regulations</li> <li>Helmet</li> <li>Gloves</li> <li>Ear plug</li> <li>Mask</li> </ul>	16

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>apply all</li> <li>emergency</li> <li>equipment</li> <li>and supplies.</li> <li>Con</li> <li>duct safety</li> <li>awareness</li> <li>training for</li> <li>sub-</li> <li>ordinates.</li> <li>Mo</li> <li>nitor safety</li> <li>environment</li> <li>Ma</li> <li>nage uses of</li> <li>safety gears.</li> <li>Cle</li> <li>aning tools</li> <li>and</li> <li>equipment.</li> </ul>		equipment. • Waste disposal.		
		(b) Controlling chemical hazards.	<ul> <li>Guest S Invite a from OS explain student control chemica</li> <li>Interne Library Guide ti to searc relevant</li> </ul>	Speaker: speaker SHA to to the about the of al hazards. et and y Search: he students h for	The student should be able to: • Inte rpret service manuals. • Use OSHA rules and regulations. • Pre pare	Chemical hazards are managed according to OSHA rules and regulations.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to control chemical hazards. Principles: The student should explain the principles	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available</li> <li>Electrical equipment</li> <li>Mechanical equipment</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	Requirements/	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
			informa the cont chemica • Group discussi Guide studer present their the control o mechanical I	tion about rol of al hazards. <b>ion:</b> nts to report on f hazards.	<ul> <li>workshop</li> <li>inspection</li> <li>report.</li> <li>Pre</li> <li>pare</li> <li>workshop</li> <li>colour code</li> <li>and safety</li> <li>signs.</li> <li>Ide</li> <li>ntify any</li> <li>safety</li> <li>hazard</li> <li>materials.</li> <li>Han</li> <li>dle</li> <li>hazardous</li> <li>materials.</li> <li>Ide</li> <li>ntify and</li> <li>apply all</li> <li>emergency</li> <li>equipment</li> <li>and supplies.</li> <li>Con</li> <li>duct safety</li> <li>awareness</li> <li>training for</li> <li>sub-</li> <li>ordinates.</li> <li>Mo</li> <li>nitor safety</li> <li>environment</li> </ul>		<ul> <li>related to control of chemical hazards.</li> <li>Theories: The student should explain: - <ul> <li>The importance of monitoring safety at working place.</li> </ul> </li> <li>Circumstantial knowledge Detailed knowledge about: <ul> <li>Safety precautions while managing hazards.</li> </ul> </li> <li>Safe handling of tools and equipment.</li> <li>Waste disposal</li> </ul>	<ul> <li>First aid kit</li> <li>Fire extinguishers</li> <li>Service manuals</li> <li>OSHA rules and regulations</li> <li>Helmet</li> <li>Gloves</li> <li>Ear plug</li> <li>Mask</li> </ul>	

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
		(c) Controlling	• <b>Guest Speaker:</b> Invite a speaker	<ul> <li>Ma nage uses of safety gears.</li> <li>Cle aning tools and equipment.</li> </ul> The student should be	Physical hazards are managed according to	Knowledge evidence:	This unit can be achieved at the	
		pphysical hazards.	<ul> <li>from OSHA to explain to the students about the control of pphysical hazards.</li> <li>Internet and Library Search: Guide the students to search for relevant information about the control of physical hazards.</li> <li>Group discussion: Guide students to present their report on the control of physical hazards.</li> </ul>	<ul> <li>able to:</li> <li>Interpret service manuals.</li> <li>Select tools and equipment.</li> <li>Use OSHA rules and regulations.</li> <li>Prepare workshop inspection report.</li> <li>Pre pare workshop colour code and safety signs.</li> <li>Ide</li> </ul>	OSHA rules and regulations	Detailed knowledge of: Method used: The student should explain how to control physical hazards. Principles: The student should explain the principles related to physical hazards. Theories: The student should explain: - • The function of inspection checklist. • The importance of posting warning signs and safety instructions.	<ul> <li>workplace or training institution. The following tools, safety gear, and equipment are to be available:</li> <li>Electrical equipment</li> <li>Mechanical equipment</li> <li>Power machines</li> <li>Measuring tools</li> <li>Cutting tools</li> <li>First aid kit</li> <li>Fire extinguishers</li> <li>Service manuals</li> <li>OSHA rules and regulations</li> <li>Helmet</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					ntify any safety hazard materials. • Han dle hazardous materials. • Ide ntify and apply all emergency equipment and supplies. • Con duct safety awareness training for sub- ordinates. • Mo nitor safety environment • Ma nage uses of safety gears. • Cle aning tools and equipment.		<ul> <li>importance of monitoring safety at working place.</li> <li>Circumstantial knowledge</li> <li>Detailed knowledge about: <ul> <li>Safety</li> <li>Safety</li> <li>precautions while</li> <li>managing hazards.</li> <li>Safe</li> <li>handling of tools and equipment.</li> <li>Waste</li> <li>disposal</li> </ul> </li> </ul>	<ul> <li>Gloves</li> <li>Earplug</li> <li>Mask</li> </ul>	
		(d)	Guest S	peaker:	The student	Ergonomic hazards	Knowledge	This unit can be	
		Controlling	Invite a	speaker	should be	are managed	evidence:	achieved at the	

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
		ergonomic hazards.	from OSHA to explain to the students about the control of ergonomic hazards. Internet and Library Search: Guide the students to search for relevant information about the control of ergonomic hazards. Group discussion: Guide students to present their report on the control of ergonomic hazards.	<ul> <li>able to:</li> <li>Interpret service manuals.</li> <li>Sel ect tools and equipment.</li> <li>Use OSHA rules and regulations.</li> <li>Pre pare workshop inspection report.</li> <li>Pre pare workshop colour code and safety signs.</li> <li>Ide ntify any safety hazard materials.</li> <li>Han dle hazardous materials.</li> <li>Con</li> </ul>	according to OSHArules and regulations.	Detailed knowledge of: Method used: The student should explain how to control ergonomic hazards. Principles: The student should explain the principles related to the control of ergonomic hazards. Theories: The student should explain: - • The function of inspection checklist. • The importance of posting warning signs and safety instructions. • The importance of monitoring safety at working place. Circumstantial knowledge Detailed knowledge about: • Safety precautions while	workplace or training institution. The following tools, safety gear, and equipment are to be available : - • Electrical equipment • Mechanica l equipment • Power machines • Measuring tools • Cutting tools • First aid kit • Fire extinguishers • Service manuals • OSHA rules and regulations • Helmet • Gloves • Ear plug • Mask	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					duct safety awareness training for sub- ordinates. • Mo nitor safety environment • Ma nage uses of safety gears. • Cle aning tools and equipment.		<ul> <li>managing hazards.</li> <li>Safe handling of tools and equipment.</li> <li>Waste disposal</li> </ul>		
	6.2 Carrying out risk assessment	(a)Performin g risk assessment.	<ul> <li>Guest S Invite a from TI explain students risk asse</li> <li>Interne Library Guide ti to searce relevant informa risk asse</li> <li>Group discuss Guide s present</li> </ul>	Speaker: speaker SA to to the s about the essment. essment. essment: he students h for t. tion about essment. ion: tudents to their report	The student should be able to: • Inte rpret service manuals. • Sel ect tools and equipment. • Sup ervise safe workshop practices to protect yourself, others, and properties.	Risk assessment carried out per OSHA standards and automobile regulations.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to perform risk assessment. Principles: The student should explain the principles related to performing risk assessment. Theories: The student should explain how to:	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>Service manuals</li> <li>OSHA regulations</li> <li>Workshop rules</li> <li>Camera</li> <li>Risk assessment</li> </ul>	15

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	Requirements/	of Periods
<b>Competency</b> )	Competen	Activities)	Methods	-	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	-
			on the ri	isk	• Rea		Carryout	sheet	
			assessm	ent.	ct properly		risk assessment.	• Mask	
					and safely		<ul> <li>Conduct</li> </ul>	• Ear plug	
					when faced		safety training.	• Gloves	
					with an		• Inspect	Overall	
					emergency.		workshop areas, tools	<ul> <li>Safety boots</li> </ul>	
					• Ide		and equipment.	<ul> <li>Safety clear</li> </ul>	
					ntify and		Circumstantial	glasses	
					apply		knowledge	Brusses	
					correctly all		Detailed knowledge		
					emergency		about:		
					equipment		Safety		
					and supplies.		precautions		
					• Ma		while carrying		
					ke periodic		out risk		
					inspections		management.		
					of the		• Safe handling of		
					workshop		tools and		
					area and all		equipment.		
					equipment,				
					and prepare				
					a report.				
					• Con				
					duct safety				
					training.				
					• Ide				
					ntify any				
					safety				
					hazard				
					materials.				
					• Han				
					dle				
					hazardous				

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
					materials				
					correctly.				
					• Pre				
					pare				
					universal				
					workshop				
					colour codes				
					and know				
					what the				
					colours				
					represent.				
					•				
					Prepare and				
					file a safe				
					report.				
					• Be				
					aware of the				
					dangers of				
					compressed				
					air.				
					• Ens				
					ure				
					availability				
					of personal				
					protective				
					equipment.				
					• Sup				
					ervise				
					compressed				
					air rules.				
					• Mo				
					nitor good				
					environment				

Module Title	Unit Title	Elements	Suggested Teaching	ng Assessment Criteria			Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
		(b) Controlling risk.	Guest Speaker: Invite a speaker from TRA to explain to the students about control of risk.     Internet and	al practices. • Cle an tools and equipment. • Stor e tools and equipment. The student should be able to: • Inte rpret service manuals.	Control risk carried out as per OSHA standard and automobile regulations.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are	
			<ul> <li>Internet and Library Search: Guide the students to search for relevant information about the control of risk.</li> <li>Group discussion: Guide students to present their report on the control of risk.</li> </ul>	<ul> <li>Sel</li> <li>ect tools and equipment.</li> <li>Sup</li> <li>Sup</li> <li>ervise the practiceof safe workshop practices to protect yourself, others, and properties.</li> <li>Rea ct correctly and safely when faced with an emergency.</li> <li>Ide</li> </ul>		<ul> <li>control risk.</li> <li>Principles: The student should explain the principles related to the control of risk.</li> <li>Theories: The student should explain how to: <ul> <li>Carryout risk assessment.</li> <li>Conduct safety training.</li> <li>Inspect workshop areas, tools and equipment.</li> </ul> </li> <li>Circumstantial knowledge Detailed knowledge</li> </ul>	<ul> <li>to be available:</li> <li>Service manuals</li> <li>OSHA regulations</li> <li>Workshop rules</li> <li>Camera</li> <li>Risk assessment sheet</li> <li>Mask</li> <li>Ear plug</li> <li>Gloves</li> <li>Overall</li> <li>Safety boots</li> <li>Safety clear glasses</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					ntify and apply correctly all emergency equipment and supplies. • Ma ke periodic inspections of the workshop area and all equipment, and prepare a report. • Con duct safety training. • Ide ntify any safety hazard material. • Han dle hazardous materials correctly. • Pre pare universal workshop colour codes		<ul> <li>about:</li> <li>Safety precautions while carrying out risk management.</li> <li>Safe handling of tools and equipment.</li> </ul>		

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods	_	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
					and know				
					what the				
					colours				
					represent.				
					• Be				
					aware of the				
					dangers of				
					compressed				
					air.				
					• Mo				
					nitor good				
					environment				
					al practices.				
					• Cle				
					an tools and				
					equipment.				
		(b)	Guest S	Speaker:	The student	Safety gears managed	Knowledge	This unit can be	
		Managing	Invite a	speaker	should be	per OSHA standards	evidence:	achieved at the	
		safety gear.	from T.	ANESCO	able to:	and automobile	Detailed knowledge	workplace or	
			to expla	ain to the	• Inte	regulations.	of:	training institution.	
			student	s about	rpret service		Method used: The	The following	
			managi	ng safety	manuals.		student should	tools, safety gear,	
			gear.		• Sel		explain how to	and equipment are	
			• Interne	et and	ect tools and		manage safety gear.	to be available:	
			Librar	y Search:	equipment.		<b>Principles:</b> The	• Service	
			Guide t	he students	• Sup		student should	manuals	
			to searc	ch tor	ervise the		explain the principles	OSHA	
			relevan	t	practice of		related to performing	regulations	
			informa	ation about	safe		The arriver The	Workshop	
			managi	ng safety	workshop		student should	rules	
			gear.		practices to		overlain how to:	• Camera	
			• Group		protect		Inspect workshop	Risk	
			discuss	ion:	yourself,		inspect worksnop	assessment	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements/</b>	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
			Cuida a	tudanta ta	othong and		areas tools and	shoot	
			Guide s	their report	properties		areas, tools and	sneet Maala	
			on the	men report	Properties.		Circumstantial	• Mask	
			manage	ment of	• Kea		knowledge	• Ear plug	
			safety g	ear.	and safely		Detailed knowledge	Ouerall	
					when faced		about:	<ul> <li>Overall</li> <li>Safety boots</li> </ul>	
					with an		Safety	<ul> <li>Safety clear</li> </ul>	
					emergency.		precautions while	glasses	
					• Ide		carrying out risk	Siasses	
					ntify and		management.		
					apply		• Safe		
					correctly all		handling of tools and		
					emergency		equipment.		
					equipment				
					and supplies.				
					• Ma				
					inspections				
					of the				
					workshop				
					area and all				
					equipment,				
					and prepare				
					a report.				
					• Con				
					duct safety				
					training.				
					• Ide				
					safety				
					hazard				
					material.				
					• Han				

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crit	Training	Number	
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
					dle				
					hazardous				
					materials				
					correctly.				
					• Pre				
					pare				
					universal				
					workshop				
					colour codes				
					and know				
					what the				
					colours				
					represent.				
					• Pre				
					pare and me				
					• De				
					dangers of				
					compressed				
					air				
					• Fns				
					ure the				
					availability				
					of personal				
					protective				
					equipment.				
					• Sup				
					ervise				
					compressed				
					air rules.				
	6.3	(a)	Interne	t and	The student	Air pollution is	Knowledge	This unit can be	24

Module Title	Unit Title	Elements	Suggested	Teaching			Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Proce	ess	<b>Product/Service</b>	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods		Asses	sment	Assessment	Assessment	Suggested	per Unit
	cies)								Resources	
	Managing	Managing	Librar	y Search	shoul	d be	managed as per rules	evidence:	achieved at the	
	environme	air	Guide s	students to	able t	to:	and regulations.	Detailed knowledge	workplace or	
	nt.	ppollution.	search	for relevant	• S	elect		of:	training institution.	
			informa	ation about	re	elevant		Method used: The	The following	
			managi	ng air	S	afety		student should	tools, safety gear,	
			pollutio	on.	g	ears.		explain how to	and equipment are	
			Guest	Speaker:	•			manage air pollution.	to be available, -	
			Invite a	n	C	Contro		Principles: The	<ul> <li>Safety boots</li> </ul>	
			Enviror	imentalist	1			student should	<ul> <li>Gloves</li> </ul>	
			to give	a lecture on	e	nviron		explain the principles	<ul> <li>Overalls</li> </ul>	
			how to	manage air	n	nental		related to managing	<ul> <li>Library</li> </ul>	
			ppollut	ion.	р	ollutio		air pollution.		
			Group		n	•		<b>Theories:</b> The		
			discuss	ion:	• N	/Iaintai		student should		
			Guide s	students to	n	a safe		explain: -		
			present	their report	e	nviron		• The importance		
			on man	aging air	n	nent.		of a safe work		
			pollutio	on.	• N	Ianage		environment.		
					a	safe		• The types of		
					р	ersonal		environmental		
					e	nviron		pollution.		
					n	nent.		• The advantages		
					• 0	Control		of monitoring		
					to	ools,		environmental		
					e	quipme		pollution.		
					n	t, and		• The importance		
					S	afety		ot preparing an		
					g	ears.		environmental		
					• 0	Control		schedule.		
					d	ifferent		• The importance		
					ty	ypes of		of controlling		
					W	vastes		different types of		
					a	s per		wastes.		

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>OSHA standard s.</li> <li>Conduct safety awarene ss training for subordi nates.</li> <li>Clean tools, equipme nt and work place.</li> </ul>		<ul> <li>Circumstantial knowledge</li> <li>Detailed knowledge</li> <li>about: <ul> <li>Safety</li> <li>knowledge while</li> <li>managing</li> <li>environmental</li> <li>pollution.</li> </ul> </li> <li>Safe handling of tools and</li> <li>equipment.</li> <li>Waste disposal.</li> </ul>		
		(b) Managing water pollution.	<ul> <li>Internet Library Guide s search f informa managin pollutio</li> <li>Guest S Invite a Environ to give a how to a water pj</li> <li>Group discussi</li> </ul>	t and y Search tudents to for relevant tion about ng water n. Speaker: n mentalist a lecture on manage pollution.	<ul> <li>The student should be able to:</li> <li>Select relevant safety gears.</li> <li>Control environ mental pollutio n.</li> <li>Maintai n a safe environ</li> </ul>	Water pollution is managed as per rules and regulations.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to manage air pollution. Principles: The student should explain the principles related to managing air pollution. Theories: The student should	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available : • Gloves • Overalls • Library	

Module Title	Unit Title	Elements	Suggested Teaching			Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
<b>Competency</b> )	Competen	Activities)	Methods	C	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	-
			Guide st	udent to	ment.		explain: -		
			present th	eir report	<ul> <li>Manage</li> </ul>		• The importance		
			on manag	ing water	a safe		of a safe work		
			pollution.		personal		environment.		
					environ		• The types of		
					ment.		environmental		
					Control		pollution.		
					tools,		• The advantages		
					equipme		of monitoring		
					nt, and		environmental		
					safety		pollution.		
					gears.		• The importance		
					Control		of preparing an		
					different		environmental		
					types of		schedule.		
					wastes		• The importance		
					as per		of controlling		
					OSHA		different types of		
					standard		wastes.		
					<b>S.</b>		Circumstantial		
					• Conduct		knowledge		
					safety		Detailed knowledge		
					awarene		about:		
					SS		<ul> <li>Safety</li> </ul>		
					training		knowledge while		
					for		managing		
					subordi		environmental		
					nates.		pollution.		
					• Clean		• Safe handling of		
					tools,		tools and		
					equipme		equipment.		
					nt and		• Waste disposal.		
					work				

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number	
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit	
				place.					
		(c) Managing land ppollution.	<ul> <li>Internet and Library Search Guide students to search for relevant information about managing land pollution.</li> <li>Guest Speaker: Invite an Environmentalist to give a lecture on how to manage land Pollution.</li> <li>Group discussion: Guide student to present their report on managing land pollution.</li> </ul>	The student should be able to: Sel ect relevant safety gears. Pre pare a preventive maintenance schedule. Control environment al pollution. Mai ntaining a safe environment Ma nage a safe personal environment Con trol tools, equipment, and safety gears.	Land pollution is managed as per rules and regulations.	<ul> <li>Knowledge evidence:</li> <li>Detailed knowledge of:</li> <li>Method used: The student should explain how to manage air pollution.</li> <li>Principles: The student should explain the principles related to managing air pollution.</li> <li>Theories: The student should explain: -</li> <li>The importance of a safe work environment.</li> <li>The types of environmental pollution.</li> <li>The aadvantages of monitoring environmental pollution.</li> <li>The importance of preparing an environmental schedule.</li> <li>The importance</li> </ul>	This unit can be achieved at the workplace or training institution. The following tools, safety gear, and equipment are to be available: • Gloves • Overalls • Library		
	1			2511		1			
Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
--	---	--	--	--	--	---	--	--	------------------------
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					trol different types of wastes as per OSHA standards. • Con duct safety awareness training for subordinates • Cle an tools and equipment. • Store tools and equipm ent.		of controlling different types of wastes. Circumstantial knowledge Detailed knowledge about: • Safety knowledge while managing environmental pollution. • Safe handling of tools and equipment. • Waste disposal.		
7.0 Managing preventive maintenance.	7.1 Planning Preventive Maintenan ce.	(a) Prepare schedules for preventive maintenance of tools, machines, and equipment.	<ul> <li>Internet Library Guide s search f informa preparin schedul prevent: mainten tools, m and equ</li> <li>Guest S Invite a speaker</li> </ul>	t and y Search: tudents to for relevant tion about ng es for ive ance of acchines, ipment. Speaker guest from the	<ul> <li>The student should be able to:</li> <li>Interpret service manuals.</li> <li>Rea d and apply workshop rules and regulations.</li> <li>Sel ect tools and equipment.</li> </ul>	Preventive maintenance is planned as per workshop standards.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to plan ppreventive maintenance. • Principles: The student should explain the principles related to planning	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available</li> <li>Workshop rules and regulations</li> <li>Gloves</li> <li>Overalls</li> <li>Safety boots</li> </ul>	31

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested	of Periods per Unit
	cies)						Resources	
			<ul> <li>manufacturing industry to describe procedures for preparing schedules for preventive maintenance of tools, machines, and equipment.</li> <li>Group discussion:</li> <li>Guide student to present their report on preparation of schedules for preventive maintenance of tools, machines, and equipment.</li> </ul>	<ul> <li>Ma         <ul> <li>Ma                  <ul></ul></li></ul></li></ul>		preventive maintenance. Theories: The student should explain the importance of planning preventive maintenance. Circumstantial knowledge Detailed knowledge about: • Safety precautions while planning preventive maintenance. • Safe handling of tools and equipment. • Waste disposal.	Library	
		an inspection	Internet and Library Search:	should be	checklist of tools,	evidence:	achieved at the	

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and Learning	Process	Product/Service	Knowledge	Requirements/	of Periods
Competency )	Competen	Activities)	Methods	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)						Resources	
		checklist of tools, equipment, and machine.	Guide students to search for relevant information about preparing schedules for preventive maintenance of tools, machines, and equipment. Guest Speaker Invite a guest speaker from the manufacturing industry to describe procedures for preparing schedules for preventive maintenance of tools, machines, and equipment. Group discussion: Guide student to present their report on preparation of schedules for preventive maintenance of tools, machines, and equipment.	<ul> <li>able to:</li> <li>Inte rpret service manuals.</li> <li>Rea d and apply workshop rules and regulations.</li> <li>Sel ect tools and equipment.</li> <li>Ma ke periodic inspections of the workshop area and all equipment.</li> <li>Pre pare workshop inspection report of tools and equipment.</li> <li>Pre pare pare preventive maintenance programmes.</li> <li>Pre pare</li> </ul>	equipment, and machines is prepared as per workshop standards.	Detailed knowledge of: Method used: The student should explain how to plan ppreventive maintenance. • Principles: The student should explain the principles related to planning preventive maintenance. Theories: The student should explain the importance of planning preventive maintenance. Circumstantial knowledge Detailed knowledge about: • Safety precautions while planning preventive maintenance. • Safe handling of tools and equipment. • Waste disposal.	<ul> <li>workplace or training institution. The following tools, safety gear, and equipment are to be available: -</li> <li>Workshop rules and regulations</li> <li>Gloves</li> <li>Overalls</li> <li>Safety boots</li> <li>Library</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Methods	Learning	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
					<ul> <li>workshop</li> <li>preventive</li> <li>maintenance</li> <li>schedule.</li> <li>Pre</li> <li>pare and use</li> <li>workshop</li> <li>colour court</li> <li>and</li> <li>safety signs.</li> <li>Pla</li> <li>n and</li> <li>Prepare</li> <li>workshop</li> <li>inventory.</li> <li>Cle</li> <li>an tools and</li> <li>equipment.</li> <li>Stor</li> <li>e tools and</li> <li>equipment.</li> </ul>				
	7.2 Supervisin g preventive maintenan ce.	(a) Performing preventive maintenance of tools, equipment, and machines.	<ul> <li>Brainst Guide the to defining performation tools, economic and made</li> <li>Practic Guide the how to prevent.</li> </ul>	orm: ne student e and preventive ance of quipment, chines. al work: ne student perform ive	The student should be able to: • Inte rpret service manuals. • Rea d and apply rules, and regulations. • Pre	Preventive maintenance of tools, equipment, and machines is performed as per workshop standards.	Knowledge evidence: Detailed knowledge of: The method used: The student should explain how to perform preventive maintenance of tools, equipment, and machines.	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available:</li> <li>General handfoot kit</li> </ul>	34

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods	_	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
			<ul> <li>maintentools, ecand mac</li> <li>Activity the stud groups to pperform prevention tools, ecand mac</li> </ul>	ance of uipment, chines. r: Arrange ents in o n ve ance of uipment, chines.	pare and apply workshop inspection report. • Pre pare and use safety signs and colour codes. • Pre pare and apply workshop preventive maintenance schedule. • Pla n and conduct preventive maintenance training. • Pra or Pre pare preventive maintenance training. • Pra pra preventive maintenance schedule.		Principles: The student should explain the principles related to performing maintenance of tools, equipment and machines. Theories: The student should explain: - • The importance of preparing and applying a preventive maintenance schedule. • The importance of preparing and using safety signs and colour codes. • The importance of preparing and using safety signs and colour codes. • The importance of pplanning and conducting preventive maintenance training. Circumstantial knowledge Detailed knowledge	<ul> <li>Workshop tools, equipment, and machines</li> <li>Service manuals</li> <li>Workshop rules and regulations</li> <li>Gloves</li> <li>Overalls</li> <li>Safety boots</li> <li>Safety clear glasses</li> <li>Helmet</li> <li>Mask</li> <li>Ear plug</li> </ul>	
					ctice correct lift and jack		Safety     precautions		

Module Title	Unit Title	Elements	Suggested Teaching		Assessment Crite	ria	Training	Number
(Main Competency )	(Specific Competen cies)	(Learning Activities)	and Learning Methods	Process Assessment	Product/Service Assessment	Knowledge Assessment	Requirements/ Suggested Resources	of Periods per Unit
				<ul> <li>safety.</li> <li>Pra ctice good electrical safety.</li> <li>Mo nitor good environment al practices.</li> <li>Cle an tools and equipment.</li> <li>Stor e tools and equipment.</li> </ul>		<ul> <li>while planning preventive maintenance.</li> <li>Safe handling of tools and equipment.</li> <li>Waste disposal.</li> </ul>		
		(b) Perform preventive maintenance of a working environment.	<ul> <li>Brainstorm: Guide the student to define and perform preventive maintenance of a working environment.</li> <li>Practical work: Guide the student how to perform preventive maintenance of tools, equipment, and machines.</li> <li>Activity: Arrange the students in groups to perform preventive</li> </ul>	The studentshould beable to:•Interpretservicemanuals•Readandapplyrules,andandregulations.Prepareandapplyworksho	Preventive maintenance of tools, equipment, machines, and buildings are performed as per workshop standards.	Knowledge evidence: Detailed knowledge of: Method used: The student should explain how to prepare preventive maintenance of the working environment. Principles: The student should explain the principles relating to performing maintenance of a working environment.	<ul> <li>This unit can be achieved at the workplace or training institution.</li> <li>The following tools, safety gear, and equipment are to be available r:</li> <li>General handfoot kit</li> <li>Workshop tools, equipment, and machines</li> <li>Service manuals</li> <li>Workshop</li> </ul>	

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	Training	Number	
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods	_	Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
			mainter	ance of a	р		Theories: The	rules and	
			working	5	inspecti		student should	regulations	
			environ	ment.	on		explain: -	Gloves	
					report.		• The iimportance	<ul> <li>Overalls</li> </ul>	
					• Prepare		of preparing and	<ul> <li>Safety boots</li> </ul>	
					and use		applying a preventive	<ul> <li>Safety clear</li> </ul>	
					safety		maintenance	glasses	
					signs		schedule.	• Helmet	
					and		• The iimportance	• Mask	
					colour		of ppreparing and	• Earplug	
					codes.		using safety signs and	1 8	
					<ul> <li>Prepare</li> </ul>		colour codes.		
					and		• The iimportance		
					apply		of pplanning and		
					worksho		conducting		
					р		preventive		
					preventi		maintenance training.		
					ve .		• The iimportance		
					mainten		of following good		
					ance		environmental		
					schedul		practices.		
					e.		Circumstantial		
					• Plan and		knowledge		
					conduct		Detailed knowledge		
					preventi		about:		
					ve		• Safety		
					mannen		precautions while		
					training		planning preventive		
					Draatia-		maintenance.		
					<ul> <li>Practice</li> </ul>		• Sate handling of		
					correct		tools and equipment.		
					nana		• Waste disposal.		
					toois				

Module Title	Unit Title	Elements	Suggested	Teaching		Assessment Crite	ria	Training	Number
(Main	(Specific	(Learning	and	Learning	Process	Product/Service	Knowledge	<b>Requirements</b> /	of Periods
Competency )	Competen	Activities)	Methods		Assessment	Assessment	Assessment	Suggested	per Unit
	cies)							Resources	
					and				
					equipme				
					nt				
					safety.				
					<ul> <li>Practice</li> </ul>				
					correct				
					lift and				
					jack				
					safety.				
					• Practice				
					good				
					electrica				
					l safety.				
					• Monitor				
					good				
					environ				
					mental				
					practice				
					<b>S.</b>				
					• Clean				
					tools				
					and				
					equipme				
					nt.				
					• Store				
					tools				
					and				
					equipme				
					nt.				

## Bibliography

 Ministry of Education, Science and Technology. (2022). *Electrical iinstallation for oordinary ssecondary education vocational stream Form I-IV*.
 Vocational Education and Training Authority: Dodoma