



Republic of Rwanda
Ministry of Education



RTB | RWANDA
TVET BOARD

DOMESTIC ELECTRICAL MAINTENANCE

ELTEM301

PERFORM DOMESTIC ELECTRICAL MAINTENANCE

Competence

RQF Level: 3

Learning Hours



90

Credits: 9

Sector: Energy

Trade: Electrical Technology

Module Type: Specific

Curriculum: ENGELT3001- TVET Level 3 in Electrical Technology

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Purpose statement	This module describes the skills, knowledge and attitude required to maintain and repair domestic electrical installation and appliances. At the end of this module, learners will be able to prepare tools, Equipment and PPE; Troubleshoot Domestic Electrical Maintenance Appliances; fix the fault in electrical appliances. Qualified learners deemed competent to this competency may work alone or with others on routine tasks in various places such as home buildings, shops, warehouses, supermarket, hospitals, pharmacies, banks, schools, garage, market, home, churches, hotels under minimum supervision.					
Learning assumed to be in place	SHE, Electrical drawing, Bench work, Basic of electricity					
Delivery modality	Training delivery	100%	Assessment	Total 100%		
	Theoretical content	30%	Formative assessment	30%		
	Practical work:	70%		70%	50%	
	<ul style="list-style-type: none"> Group project and presentation 					20%
	<ul style="list-style-type: none"> Individual project /Work 					50%
	Summative Assessment		50%			

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Perform Electrical Installation Maintenance Activities	1.1. Electrical Installation is properly inspected based on electrical diagram
	1.2. Maintenance types are properly identified based on Installation working conditions
	1.3. Tools, materials and equipment are correctly selected according to the type of maintenance and activities to be carried out.
	1.4. Maintenance activities are correctly scheduled in line with the site location and availability of maintenance resources.
	1.5. Maintenance cost is correctly determined in line with activities, type and quantity of materials.
	1.6. Installation is correctly tested in line with working operation testing standards.
	1.7. Faults are correctly maintained in line with the proper working operation.
2. Test Domestic	2.1. Electrical appliances are properly identified based on their types and working principle
	2.2. Electrical appliances parameters are precisely rated based on their power consumption
	2.3. Electrical appliances faults and causes are correctly identified based on appliance working operation

	2.4. Electrical appliances are properly inspected and tested in line with their functionality
3. Perform Kettle Repairing Activities	3.1. The water cooker is properly described in line with instruction manual.
	3.2. Tools and the materials are adequately prepared following the identified faults.
	3.3. Defective components are properly troubleshot based on root causes.
	3.4. Kettle functionality is correctly tested following the working principle.
	3.5. Repaired parts are properly assessed and re-assembled with respect to instruction manual
4. Perform Iron Repairing Activities	4.1. The iron is properly described in line with instruction manual.
	4.2. Tools and the materials are adequately prepared following the identified faults.
	4.3. Defective components are appropriately maintained / replaced based on root causes.
	4.4. Iron functionality is correctly tested following the working principle
	4.5. Repaired parts are properly assessed and re-assembled with respect to instruction manual
5. Perform Cooker Repairing Activities	5.1. The water cooker is properly described in line with instruction manual.
	5.2. Tools and the materials are adequately prepared following the identified faults.
	5.3. Defective components are appropriately maintained / replaced based on root causes.
	5.4. Cooker functionality is correctly tested following the working principle
	5.5. Repaired parts are properly assessed and re-assembled with respect to instruction manual
6. Perform Fridge Repairing Activities	6.1. The fridge is properly described in line with instruction manual.
	6.2. Tools and the materials are adequately prepared following the identified faults.
	6.3. Defective components are appropriately maintained / replaced based on root causes.
	6.4. Fridge functionality is correctly tested following the working principle
	6.5. Repaired parts are properly assessed and re-assembled with respect to instruction manual
7. Perform Water Heater Repairing Activities	7.1. The water heater is properly described in line with instruction manual.
	7.2. Tools and the materials are adequately prepared following the identified faults.
	7.3. Defective components are appropriately maintained / replaced based on root causes.
	7.4. Water heater functionality is correctly tested following the working principle
	7.5. Repaired parts are properly assessed and re-assembled with respect to instruction manual

Course content

Learning outcomes	At the end of the module the learner will be able to: <ol style="list-style-type: none">1. Perform Electrical Installation Maintenance Activities2. Inspect and Test Domestic Electrical Appliances3. Perform Kettle Repairing Activities4. Perform Iron Repairing Activities5. Perform Cooker Repairing Activities6. Perform Fridge Repairing Activities7. Perform Water Heater Repairing Activities
Learning outcome 1: Perform Electrical Installation Maintenance Activities	Learning hours: 30
Indicative content	
<ul style="list-style-type: none">● Inspection of Electrical Installation<ul style="list-style-type: none">✓ Information gathering✓ Installation requirements✓ Visual inspection✓ Installation diagrams● Identification of Maintenance types<ul style="list-style-type: none">✓ Installation working conditions✓ Preventive maintenance✓ Curative maintenance● Tools, materials and equipment<ul style="list-style-type: none">✓ Tools✓ Materials✓ Equipment● Scheduling maintenance activities<ul style="list-style-type: none">✓ Installation location✓ Maintenance activities✓ Maintenance resources✓ Activity timing and workload	

- **Maintenance cost estimation**
 - ✓ Material quantity and price
 - ✓ Labour cost
 - ✓ Total maintenance cost
- **Maintenance performance**
 - ✓ Testing instruments
 - ✓ Installation faults, causes and measures
 - ✓ Maintenance techniques

Resources required for the learning outcome

Equipment	Insulator tester: Megger, Multi meter, Phase tester, Ground tester, Belt Machine, Indicator lamp, First aid kit, Personal Protective Equipment
Materials	Insulation tape, Single core cable, Stranded core cable, VOB, Earth wire, Screws
Tools	Screw Driver kit, Pliers Kit, Measurement tape, Spirit Level, Hack saw, Electric Hammer, Electric knife, Spans Kit, Electrical wire short, Notebook / Pen, Flashlight, Plumb wire, Wire drawer
Facilitation techniques / learning activities	<ul style="list-style-type: none"> ▪ Individual and group work, Practical exercise, Group discussion, Brainstorming. Physical demonstration, Simulation, Practical Workshops, Further research on internet
Formative assessment methods	<ul style="list-style-type: none"> ▪ Written assessment, Oral presentation, Performance assessment, Product based assessment

Learning outcome 2: Inspect and Test Domestic Electrical Appliances

Learning hours: 10

Indicative content

- **Identification of domestic appliances**
 - ✓ Types of appliances
 - ✓ Working principle
- **Rating of domestic appliances**
 - ✓ Name plate information
 - ✓ Power consumption
 - ✓ Electrical parameters
- **Identification of domestic appliances faults**

- ✓ Types of electrical appliances faults
- ✓ Root causes
- ✓ Prevention measures
- **Inspection and testing**
 - ✓ Physical inspection
 - ✓ Testing instruments
 - ✓ Testing techniques

Resources required for the indicative content

Equipment	Insulator tester: Megger, Multi meter, Phase tester, Ground tester, First aid kit, Personal Protective Equipment
Materials	Electrical kettle, Water heater, Electrical iron, Electrical cooker, Electrical iron, washing machine, Hair cutting machine
Tools	Screw Driver kit, Pliers Kit, Measurement tape, Spirit Level, Hack saw, Electric Hammer, Electric knife, Spans Kit, Electrical wire short, Notebook / Pen, Flashlight, Plumb wire, Wire drawer
Facilitation techniques / learning activities	<ul style="list-style-type: none"> • Individual and group work • Practical exercise • Group discussion • Brainstorming • Physical demonstration • Simulation, Practical Workshops • Further research on internet
Formative assessment methods	<ul style="list-style-type: none"> • Written assessment • Oral presentation • Performance assessment • Product based assessment

Learning outcome 3: Perform Kettle Repairing Activities	Learning hours: 10
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Indicative content

- **Description of kettle**
 - ✓ Kettle components
 - ✓ Appliance symbols
- **Preparation of tools and materials**
 - ✓ Kettle faults
 - ✓ Testing instruments
 - ✓ Tools and materials
- **Troubleshoot of kettle defective components**
 - ✓ Kettle switch
 - ✓ Heating resistance
 - ✓ Defective wires / cables
- **Test after maintenance**
 - ✓ Kettle functionality
- **Re-assembling**
 - ✓ Kettle operation assessment
 - ✓ Reassembling techniques

Resources required for the indicative content

Equipment	Insulator tester: Megger, Multi meter, Phase tester, Ground tester, First aid kit, Personal Protective Equipment
Materials	Insulation tape, Single core cable, Stranded core cable, VOB, Earth wire, Screws, Electrical kettle
Tools	Screw Driver kit, Pliers Kit, electric knife, Spans Kit, Notebook / Pen, Flashlight
Facilitation techniques / learning activities	<ul style="list-style-type: none"> ● Individual and group work ● Practical exercise ● Group discussion ● Brainstorming ● Physical demonstration

	<ul style="list-style-type: none"> • Simulation, Practical Workshops • Further research on internet
Formative assessment methods	<ul style="list-style-type: none"> • Written assessment • Oral presentation • Performance assessment • Product based assessment

Learning outcome 4: Perform Iron Repairing Activities	Learning hours: 10
Indicative content	
<ul style="list-style-type: none"> • Description of iron <ul style="list-style-type: none"> ✓ Iron component ✓ Appliance symbols • Preparation of tools and materials <ul style="list-style-type: none"> ✓ Iron faults ✓ Testing instruments ✓ Tools and materials • Troubleshoot of iron defective components <ul style="list-style-type: none"> ✓ Iron switch ✓ Fuse ✓ Heating resistance ✓ Defective wires / cables • Test after maintenance <ul style="list-style-type: none"> ✓ Iron functionality • Re-assembling <ul style="list-style-type: none"> ✓ Iron operation assessment ✓ Reassembling techniques 	
Resources required for the indicative content	

Equipment	Insulator tester: Megger, Multi meter, Phase tester, Ground tester, First aid kit, Personal Protective Equipment
Materials	Insulation tape, Single core cable, Stranded core cable, VOB, Earth wire, Screws, Electrical iron
Tools	Screw Driver kit, Pliers Kit, electric knife, Spans Kit, Notebook / Pen, Flashlight
Facilitation techniques / learning activities	<ul style="list-style-type: none"> • Individual and group work • Practical exercise • Group discussion • Brainstorming • Physical demonstration • Simulation, Practical Workshops • Further research on internet
Formative assessment methods	<ul style="list-style-type: none"> • Written assessment • Oral presentation • Performance assessment • Product based assessment

Learning outcome 5: Perform Cooker Repairing Activities	Learning hours: 10
Indicative content	
<ul style="list-style-type: none"> • Description of cooker <ul style="list-style-type: none"> ✓ Cooker components ✓ Components symbols • Preparation of tools and materials <ul style="list-style-type: none"> ✓ Cooker faults ✓ Testing instruments ✓ Tools and materials 	

- **Troubleshoot of cooker defective components**

- ✓ Cooker switch
- ✓ Fuse
- ✓ Heating resistance
- ✓ Fuse
- ✓ Timer
- ✓ Defective wires / cables

- **Test after maintenance**

- ✓ Cooker functionality

- **Re-assembling**

- ✓ Cooker operation assessment
- ✓ Reassembling techniques

Resources required for the indicative content

Equipment	Insulator tester: Megger, Multi meter, Phase tester, Ground tester, First aid kit, Personal Protective Equipment
Materials	Insulation tape, Single core cable, Stranded core cable, VOB, Earth wire, Screws, Electrical cooker
Tools	Screw Driver kit, Pliers Kit, electric knife, Spans Kit, Notebook / Pen, Flashlight
Facilitation techniques / learning activities	<ul style="list-style-type: none"> ● Individual and group work ● Practical exercise ● Group discussion ● Brainstorming ● Physical demonstration ● Simulation, Practical Workshops ● Further research on internet
Formative assessment methods	<ul style="list-style-type: none"> ● Written assessment ● Oral presentation ● Performance assessment

- Product based assessment

Learning outcome 6: Perform Fridge Repairing Activities

Learning hours: 10

Indicative content

- **Description of fridge**
 - ✓ Fridge components
 - ✓ Components symbols
- **Preparation of tools and materials**
 - ✓ Fridge faults
 - ✓ Testing instruments
 - ✓ Tools and materials
- **Troubleshoot of fridge defective components**
 - ✓ Fridge switch
 - ✓ Heating resistance
 - ✓ Defective wires / cables
 - ✓ Power supply
 - ✓ Start capacitor
- **Test after maintenance**
 - ✓ Fridge functionality
- **Re-assembling**
 - ✓ Fridge operation assessment
 - ✓ Reassembling techniques

Resources required for the indicative content

Equipment

Insulator tester: Megger, Multi meter, Phase tester, Ground tester, First aid kit, Personal Protective Equipment

Materials	Insulation tape, Single core cable, Stranded core cable, VOB, Earth wire, Screws, Fridge
Tools	Screw Driver kit, Pliers Kit, electric knife, Spans Kit, Notebook / Pen, Flashlight
Facilitation techniques / learning activities	<ul style="list-style-type: none"> • Individual and group work • Practical exercise • Group discussion • Brainstorming • Physical demonstration • Simulation • Practical Workshops • Further research on internet
Formative assessment methods	<ul style="list-style-type: none"> • Written assessment • Oral presentation • Performance assessment • Product based assessment

Learning outcome 7: Perform Water Heater Repairing Activities	Learning hours: 10
Indicative content	
<ul style="list-style-type: none"> • Description of water heater electrical diagram <ul style="list-style-type: none"> ✓ Water heater components ✓ Components symbols • Preparation of tools and materials <ul style="list-style-type: none"> ✓ Water heater faults ✓ Testing instruments ✓ Tools and materials • Troubleshoot of water heater defective components <ul style="list-style-type: none"> ✓ Water heater switch ✓ Heating resistance 	

<ul style="list-style-type: none"> ✓ Defective wires / cables ✓ Power supply • Test after maintenance <ul style="list-style-type: none"> ✓ Water heater functionality • Re-assembling <ul style="list-style-type: none"> ✓ Water heater operation assessment ✓ Reassembling techniques

Resources required for the indicative content

Equipment	Insulator tester: Megger, Multi meter, Phase tester, Ground tester, First aid kit, Personal Protective Equipment
Materials	Insulation tape, Single core cable, Stranded core cable, VOB, Earth wire, Screws, Electrical water heater
Tools	Screw Driver kit, Pliers Kit, electric knife, Spans Kit, Notebook / Pen, Flashlight
Facilitation techniques / learning activities	<ul style="list-style-type: none"> • Individual and group work • Practical exercise • Group discussion • Brainstorming • Physical demonstration • Simulation • Practical Workshops • Further research on internet
Formative assessment methods	<ul style="list-style-type: none"> • Written assessment • Oral presentation • Performance assessment • Product based assessment

Integrated/Summative assessment

Integrated situation

Heaven garden is a TVET training center that is private, located in Kicukiro district, Kigali city, near Kicukiro taxi parking along Bugesera road. The training center has seven classes installed with seven fluorescent lamps of 40W, 220V, 50Hz, controlled by a two-way switch, and a central hall/meeting of 20mx12m in length and width, respectively. The hall has 16 ceiling LED tubes 9W x 4 of 60cmx60cm dimensions, controlled by two two-way gang switches. Each class has three power socket outlets of 16A, and the main hall has six socket-outlets of 16A each. And the main entrance has six socket-outlets of 16A each. The school also has 2 single-phase motor pumps of 1.5Kw, 230V, 50Hz each, freezer of 300W, 230V, and 50Hz. The supply cable of 3x2. 5sq.mm sometimes overheats, and some squared underground junction boxes were accidentally filled with sand and water. And also, they are one of the fluorescent lamps of classes that continuously blink when switched ON. The training center would like to hire you as an experienced electrician to maintain the entire electrical installation. All tools, materials, and equipment are provided. You are required to prepare a cost estimation of all works done, and the task must be done in 7hours

All required materials, tools and equipment are available

Resources

Tools	Combination pliers, Cutting pliers, Long nose pliers, Tape measure, Electrical hammer, Phase tester, Electrical knife, Crimping tool, Flat screw drivers, Star screw drivers
Equipment	Ladder, Multimeter, Clamp on meter, Frequency meter, Phase sequence meter
Materials/ Consumables	Helmet, Safety shoes, Overall or over coat, Goggles, Gloves, Insulation tape

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
Learning outcome 1: Perform Electrical Installation	1.1. Electrical Installation is properly inspected based on electrical diagram	Electrical installation is properly inspected			5
	1.2. Maintenance types are properly identified based	Maintenance type is properly identified			2

Maintenance Activities (40%)	on Installation working conditions			
	1.3. Tools, materials and equipment are correctly selected according to the type of maintenance and activities to be carried out.	Tools, materials and equipment are correctly selected.		3
	1.4. Maintenance activities are correctly scheduled in line with the site location and availability of maintenance resources	Maintenance activities are correctly scheduled		10
	1.5. Maintenance cost is correctly determined in line with activities, type and quantity of materials	Maintenance cost is correctly determined		2
	1.6. Installation is correctly tested in line with working operation testing standards	Electrical installation is corrected tested		3
	1.7. Faults are correctly maintained in line with the proper working operation	Faults are correctly maintained		15
	Learning outcome 2: Inspect and Test Domestic Electrical Appliances (20%)	2.2. Electrical appliances are properly identified based on their types and working principle	Electrical appliances are properly identified	
	2.3. Electrical appliances parameters are precisely	Electrical appliances parameters are precisely rated		4

	rated based on their power consumption				
	2.4. Electrical appliances faults and causes are correctly identified based on appliance working operation	Electrical appliances faults and causes are correctly identified			10
	2.5. Electrical appliances are properly inspected and tested in line with their functionality	Electrical appliances are properly inspected and tested			3
Learning outcome 3: Perform appliances Repairing Activities (40%)	3.1. Appliances are correctly described sketched in line with instruction manual	Appliances components are correctly described			5
		Components symbols are correctly identified			3
	3.2. Tools and the materials are adequately prepared following the identified faults	Tools and the materials are adequately prepared			4
	3.3. Defective components are appropriately maintained / replaced based on root causes	Defective components are appropriately maintained / replaced			15
	3.4. Appliances functionality is correctly tested following the working principle	Appliances functionality are correctly tested			8
	3.5. Repaired parts are properly assessed and re-	Repaired parts are properly assessed and re-assembled			5

	assembled with respect to instruction manual				
Total marks		100			
Percentage Weightage		100%			
Minimum Passing line % (Aggregate): 70%					

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