



Republic of Rwanda
Ministry of Education



RTB | RWANDA
TVET BOARD

GENFE301

FUNDEMENTALS OF ELECTRICITY

APPLY FUNDAMENTALS of OF ELECTRICITY

Competence

RQF Level: 3

Learning Hours

Credits: 7



Sector: COMPUTER SYSTEM AND ARCHITECTURE

Trade: Computer System and Architecture

Module Type: General

Curriculum: ELTELT3001 -TVET Level III in Electronics and Telecommunication,
ICTCSA3001- TVET Level III in Computer System and Architecture

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Purpose statement	<p>In their daily activities, computer technicians have to deal with electrical installations. This is because, most of electronic devices equipment and systems are supplied from normal electricity supply. At some extent, computer technicians have even to make changes or alterations in the existing installations to accomplish their tasks. Therefore, computer technicians need to be equipped with basics knowledge and skills in electrical installations that will enable them to effectively accomplish their work.</p> <p>At the end of this module, learners will be equipped with necessary knowledge, skills and attitudes to perform domestic electrical installations, while applying basic electrical installations concepts.</p>					
Delivery modality	Training delivery		100%	Assessment		Total 100%
	Theoretical content		30%	Formative assessment	30%	50%
	Practical work:		70%		70%	
	<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. Apply basic concepts of electricity	1.1. Electrical quantities are properly identified according to their types
	1.2. Electrical signal are properly identified according to their characteristics
	1.3. DC circuits laws and theorems are identified according to their applications
	1.4. Resonant circuits are properly identified according to their types
	1.5. Different types of transformers are correctly applied according to magnetism and electromagnetism concepts
2. Perform domestic electrical installations	2.1. Electrical diagrams are correctly realized according to their types
	2.2. Tools, materials and equipment are properly selected according to their types
	2.3. Electrical Conduit laying and wiring/Cabling and Connections is correctly performed according to electrical diagrams
	2.4. Electrical Lighting, Power Sockets and protective equipment are correctly installed according to their types
	2.5. Electrical installations are properly tested according to testing techniques

3. Perform post operation activities	3.1. Electrical materials, equipment and tools are properly stored according to the storage conditions
	3.2. Workplace is correctly cleaned according to the hygiene and safety precautions
	3.3. Installation report is correctly elaborated according to the work done

Course content

Learning outcomes	At the end of the module the learner will be able to: <ol style="list-style-type: none"> 1. Apply basic concepts of electricity 2. Perform domestic electrical installations 3. Prepare Technical Report And Invoice
Learning outcome 1: Apply basic concepts of electricity	Learning hours: 15

Indicative content

<ul style="list-style-type: none"> • Introduction to electricity • Identification of electrical quantities <ul style="list-style-type: none"> ✓ Current ✓ Voltage, electrical potential and e.m.f ✓ Power and Energy ✓ Resistance and conductance • Analyse the characteristics of AC signal <ul style="list-style-type: none"> ✓ Types of electric signal waveforms ✓ Components of electric signal waveforms (Period, Frequency, Current, Voltage, amplitude) ✓ RMS, Peak, and Peak to Peak conversions • Application of DC circuits laws and Theorems <ul style="list-style-type: none"> ✓ Ohm's law ✓ Series, parallel and mixed connection of resistors, capacitors and inductors. ✓ Kirchhoff's laws ✓ Thevenin's theorem ✓ Norton's theorem ✓ Superposition theorem ✓ Maximum power transfer theorem • Study the behavior of different AC circuits <ul style="list-style-type: none"> ✓ Single-phase series RLC circuits ✓ Single-phase parallel RLC circuits 	
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- ✓ Analyse Resonance in AC Circuits
- **Introduction to magnetism and electro-magnetism**
 - ✓ Magnetic field, flux and flux density
 - ✓ Types magnetic materials (Ferromagnetic, Paramagnetic, Ferri-magnetic, Electromagnet)
 - ✓ Applications of magnetism
- **Application of basic concepts of transformers**
 - ✓ Working principle of transformer
 - ✓ Types of transformers
 - ✓ Calculations on transformers

Resources required for the learning outcome

Equipment	White board,black board, Projector, Computer
Materials	Chalk, Marker pen, Flip Chart, internet bundles,Electronic components (resistor,capacitor,inductor, transformer)
Tools	Drawing kit, Calculator
Facilitation techniques and learning activities	<ul style="list-style-type: none"> • Brain storming • Demonstration • Individual and group work • Practical exercise
Formative assessment methods	<ul style="list-style-type: none"> • Written assessment • Oral presentation • Performance based assessment

Learning outcome 2: Perform domestic electrical installations	Learning hours: 30
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Indicative content

- **Realization of electrical diagrams**
 - ✓ Symbol used in Electrical circuit installation
 - ✓ Identification of different types of electrical diagrams
- **Identification of different types of tools, materials and equipment used in electrical circuit installation**
 - ✓ Types of tools
 - ✓ Types of materials
 - ✓ Types of equipment
- **Electrical Conduit laying**
 - ✓ Types of electrical conduit and their fittings
 - ✓ Sizes of electricals conduits

- ✓ Laying techniques of electrical conduits
- **Wiring/Cabling and Connection of wires/cables**
 - ✓ Types of wire/cables
 - ✓ Wire/Cable selection and sizing
 - ✓ Wire/cable color coding
 - ✓ Wire/cable connection techniques
 - ✓ Wire/cable labelling and termination techniques
- **Installation of domestic electrical component**
 - ✓ Switches
 - ✓ electrical lighting
 - ✓ power sockets outlets
 - ✓ electric bells
 - ✓ protection devices and systems
- **Testing techniques of electrical installations**
 - ✓ Continuity testing
 - ✓ Current measurement
 - ✓ Voltage measurement
- **Development of detailed installation report**

Resources required for the indicative content

Equipment	PPE, powered electrical screw driver, multi-meter, reverting machine, drilling machine, Electric grinder, clamp-on ammeter, megohmmeter, wattmeter, phase sequence tester, multi-function tester
Materials	One way switch, double pole one-way switch, two gang switch, door release push button, ring push button, bell push button, cables, wires, Two-way switch, intermediate switch, pull-switch, two gang two-way switch, smartswitches, Timer switch, twilight switch, sensors, sockets, conduits, drawing papers, internet bundles
Tools	Electrical tool kit, drawing tools
Facilitation techniques and learning activities	<ul style="list-style-type: none"> • Demonstration and simulation • Individual and group work • Practical exercise
Formative assessment methods	<ul style="list-style-type: none"> • Written assessment • Oral presentation • Performance assessment • Product based assessment

Learning outcome 3: Perform post operation activities	Learning hours: 25
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Indicative content

- **Storing electrical materials, equipment and tools**
 - ✓ Methods of storing electrical materials, tools and equipment
 -  Storage container types
 -  Organization tips
 -  Storage environment
 - ✓ Maintaining electrical equipment safety
- **Cleaning the workplace**
 - ✓ Identification of tools, materials and equipment used to clean the workplace
 - ✓ Cleaning techniques
 - ✓ Management of Waste materials
- **Elaboration of detailed installation report.**

Resources required for the indicative content

Equipment	White board,black board, Projector, Computer
Materials	Chalk, Marker pen, Flip Chart, internet bundles,cleaning materials(cleaning solution, soap, water)
Tools	cleaning tools (Broom, dustpan ,Cleaning brushes and mop), dustbin
Facilitation techniques and learning activities	<ul style="list-style-type: none"> • Brain storming • Demonstration • Individual and group work • Practical exercise
Formative assessment methods	<ul style="list-style-type: none"> • Written assessment • Oral presentation • Performance based assessment

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2. D. M. Buchla, Experiments in electronics fundamentals and electric circuits fundamentals to accompany, Fourth Edi. Prentice Hall, 2010.
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ACCRONYMS:

AC : Alternating Current

DC : Direct Current

RMS : Root Mean Square

RLC : Resistor Inductor Capacitor