

ELECTRICAL PRINCIPLES III

UNIT CODE: 0713441 14A

TVET CDACC UNIT CODE: ENG/CU/MDE/CC/11/5/MA

UNIT DURATION: 80 HOURS

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Apply Electrical Principles III.

UNIT DESCRIPTION

This unit describes competences required to apply electrical principles in their work. It involves performing electrical measurements, applying basic electrical machines, applying three phase power supply and applying transients in dc circuits.

Summary of Learning Outcomes

Learning Outcome	Duration in hours.
1. To perform electrical measurements.	20
2. To apply basic electrical machines	20
3. To apply three phase power supply	20
4. To apply transients in dc circuits	20
TOTAL	80

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Perform electrical measurements	1.1 Types of transducers 1.2 Types of electrical instruments 1.3 Measurements of electrical quantities using Instruments 1.4 Calculations involving electrical	<ul style="list-style-type: none">• Practical Assessment• Project• Third Party Report• Portfolio of Evidence• Written Assessment

	<p>instruments</p> <p>1.5 Instrumental systematic errors</p> <p>1.6 Calculations involving systematic errors</p>	<ul style="list-style-type: none"> • Oral Questioning
2. Apply basic electrical machines	<p>2.1 Electrical machines identification</p> <p>2.2 electrical machines operations</p> <p> 2.2.1 DC motors</p> <p> 2.2.2 DC generators</p> <p> 2.2.3 AC single phase motors</p> <p> 2.2.4 AC three phase machines: Induction, Synchronous</p> <p> 2.2.5 Transformer</p> <p>2.3 Derivation of generator e.m.f equation</p> <p>2.4 Electrical machine control</p> <p>2.5 Calculations involving electrical machines</p> <p>2.6 Applications of electrical machines</p>	<ul style="list-style-type: none"> • Practical Assessment • Project • Third Party Report • Portfolio of Evidence • Written Assessment • Oral Questioning
3. Apply three phase power supply	<p>3.1 Principles of three phase power generation</p> <p>3.2 Connections of three phase power supply</p> <p> 3.2.1 Star and delta connection</p> <p>3.3 Calculations involving three phase power supply connections</p> <p>3.4 Measurements of three phase power supply</p> <p> 3.4.1 One wattmeter method</p> <p> 3.4.2 Two wattmeter method</p> <p> 3.4.3 Three wattmeter method</p>	<ul style="list-style-type: none"> • Practical Assessment • Project • Third Party Report • Portfolio of Evidence • Written Assessment • Oral Questioning

<p>4. Apply transients in Electrical DC Circuits</p>	<p>4.1 Derivation of growth and decay equations in R-L and R-C circuits.</p> <p>4.2 Sketching of Growth and decay curves in R-L and R-C circuits</p> <p>4.3 Calculations involving Growth and decay in R-L and R-C circuits based on the time constants.</p> <p>4.4 Application of the effect of time constant in switching inductive and capacitive loads</p> <p>4.5 Analysis of Passive and active filters</p>	<ul style="list-style-type: none"> • Practical Assessment • Project • Third Party Report • Portfolio of Evidence • Written Assessment • Oral Questioning
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Suggested Methods of Instruction

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- Practical
- Projects
- Demonstrations
- Group Discussions
- Field trips
- On-job-training

Recommended Resources for 25 trainees

S/No.	Category/Item	Description/Specifications	Quantity	Recommended Ratio (Item: Trainee)
A	Learning Materials			
1.	Textbooks	J. Bird Electrical and Electronic	5 pcs	1:5

		Principles V.K. Mehta & R. Mehta Basic Electrical Engineering		
2.	Installation manuals	Electronic components datasheets	5 pcs	1:5
3.	Charts	Circuit diagrams Colour codes	1 pcs for each	1:25
4.	Scientific Calculators		25	1:1
5.	Power point presentations	For trainer's use	1	1:25
B	Learning Facilities & infrastructure			
6.	Lecture/theory room	60m ²	1	1:25
7.	Workshop	150m ²	1	1:25
C	Consumable materials			
8.	Connector wires	Jumper wires,	5 pkts	1:5
9.	Insulation tapes		25 pcs	1:1
10.	Circuit boards	Bread board, copper strip boards	25 pcs	1:1
11.	Assorted electronic components	Resistors, diodes, capacitors, transistors, ICs, Transformers,	25 pcs	1:1

		Inductors, Batteries		
12.	Soldering wires		5 rolls	1:5
D	Tools and Equipment			
13.	Striping knives		25 pcs	1:1
14.	Side cutters		25 pcs	1:1
15.	Pliers		25 pcs	1:1
16.	Assorted Screw driver		25 pcs	1:1
17.	Crimping tools		5 pcs	1:5
18.	PPEs		25 pcs	1:1
19.	Multimeters	easyvet.com	5 pcs	1:5
20.	Oscilloscope		5 pcs	1:5
21.	Function generator		5 pcs	1:5
22.	Spectrum analyser		5 pcs	1:5
23.	Variable power supply		5 pcs	1:5
24.	Solder guns		25 pcs	1:1
25.	Hot air gun		5 pcs	1:5
26.	Work stations		25	1:1