

**Electrical Installation and Maintenance Work -  
National Technical Certificate (NTC) and Advanced  
National Technical Certificate (ANTC)**

**Electrical/Electronics Drawing**

<b>PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN ELECTRICAL INSTALLATION AND MAINTENANCE WORK</b>		
<b>MODULE: ELECTRICAL/ELECTRONICS DRAWING</b>	<b>Course Code: CTD 14</b>	<b>Contact Hours: 96 Hours</b>
<p><b>GOAL:</b> The module is designed to provide the trainee to understand the block and basic diagrams in circuit development.</p> <p><b>General Objectives:</b></p> <p>On completion of this module, the trainee should be able to:-</p> <ol style="list-style-type: none"> <li>1. Understand the block and basic diagrams in circuit development.</li> <li>2. Understand the electronic component symbols</li> </ol>		

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<b>Course Specification: Theoretical Content</b>			
<b>General Objective 1.0: Understand the Block and Basic Diagrams in Circuit Development.</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
1-7	<p>1.1 Explain the purposes of block flow and logic diagrams.</p> <p>1.2 Explain symbols used in preparation of block and logic diagrams.</p> <p>1.3 Explain how to plan an arrangement of block symbols to produce Intelligible block and flow diagrams.</p> <p>1.4 Describe drafting procedure for preparation of easily understood block diagrams.</p> <p>1.5 Explain the elements of logic symbols diagrams</p> <p>1.6 Draw block diagrams for electronic systems e.g radio, television, etc.</p> <p>1.7 Draw flow diagrams for typical industrial production.</p>	<ul style="list-style-type: none"> <li>• Explain to students how blocks flow and basic diagrams can be used to describe flow of information.</li> <li>• Draw different types of symbols used and sequence of arrangements when drawing block, flow logic.</li> <li>• Explain the difference between flow diagrams and block diagrams use examples to illustrate the difference.</li> <li>• Explain methods to be used to prepare good diagrams</li> <li>• Draw logic symbols and their functions using truth table</li> </ul>	<ul style="list-style-type: none"> <li>• Chalkboard.</li> </ul>

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<b>General Objective 1.0: Understand the Block and Basic Diagrams in Circuit Development.</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
1-7		<ul style="list-style-type: none"> <li>• Draw block diagrams for common electronic systems e.g Radio, TV</li> <li>• Draw flow diagram for producing typical items in an industry.</li> </ul>	
<b>General Objective 2.0: Understand the Electronic Component Symbols</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
8-10	2.1 Explain the need for electronic symbols and schematic diagrams. 2.2 Explain the basic functions of commonly used electronic component 2.3 Relate component symbol shape to component functions.	<ul style="list-style-type: none"> <li>• Explain why standard symbols are used in circuits.</li> <li>• Show as many components as possible and explain their functions.</li> <li>• Explain the functions of each component</li> </ul>	• Chalkboard
11 12.	2.4 Develop proficiency in drawing electronic symbols in acceptable standard form. 2.4 Learn to produce sketches of physical structures of common components e.g Resistors, Capacitors, Transformers, Diodes, Transistors variable resistors, Potentiometers switches, Batteries, Microphone, Recording, Pick up lead cerial, play back pick up lead etc.	<ul style="list-style-type: none"> <li>• Familiarise with common component symbols.</li> <li>• Sketch the exact physical resembles/anal of common components.</li> </ul>	• Chalkboard
<b>General Objective 3.0: Basic Circuits</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
1-6	3.1 Explain electronic symbols through circuit application e.g in simple amplifier.	• Explain how components are connected together to make a circuit using symbols.	• Chalkboard.
	3.2 Explain the purpose of schematic diagram.	• Draw schematic diagram and explain how it functions.	• Chalkboard

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<b>General Objective 3.0: Basic Circuits</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
1-6	3.3 Identify the basic elements needed in all electronic circuit.	• Explain the elements needed in most basic circuit.	• Chalkboard • Drawing sheet
	3.4 Identify the basic circuits which make up a complete electronic device.	• Identify stages needed in a typical electronic system.	• Chalkboard • Schematic diagram.
	3.5 Explain how to train a diagram of popular circuits e.g single stage, common emitter amplifier, 2-stage common emitter amplifier, power supply circuit receiver circuit, etc.	• Explain how a signal can be traced in a schematic diagram using left-right rule. Draw same of the circuits.	• Chalkboard • Schematic diagram.
<b>General Objective 4.0: Schematic Diagrams</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
7-9	4.1 Explain the need for conformity in drawing schematic drawings.	• Explain the need for conformity when drawing schematic diagrams. • Show a schematic diagram indicating references symbol positions. • Students to copy examples. • Explain the need for symmetry and balance when drawing schematic diagrams. Show examples. • Students must draw.	• Chalkboard • Schematic diagram
	4.2 Identify properly drawn schematic diagrams		
	4.3 Explain symmetry and balance in drawing schematic diagram.		
	4.4 Show symbol placement and space arrangement for maximum legibility.		
10-12	4.5 Draw the stages of a schematic diagram in proper sequential manner.	• Draw schematic diagram in sequential manner and explain how signal flow through. Show how to make parts list. • Explain how to convert simple wiring diagram to schematic diagrams and vice versa. • Explain the need to place component nos by the particular side of a component.	• Chalkboard. • Prepared drawings. • Schematic diagram.
	4.6 Explain how to convert a bread-boarder circuit into a proper schematic diagram.		
	4.7 Develop consistency in components code or reference location on the schematic diagram.		

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<b>General Objective 5.0: Industrial control Wiring Diagrams.</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
1-6	<p>5.1 Explain the differences among industrial power and residential wiring diagrams compared to electronic wiring diagrams.</p> <p>5.2 Explain how to read industrial control wiring diagrams.</p> <p>5.3 Identify electrical symbols used in power distribution diagrams.</p> <p>5.4 Explain the basic differences between AC and DC motors</p> <p>5.5 Explain the need for special starting circuits for industrial motors.</p> <p>5.6 Explain the basic principles of operations of electrical protective devices using their circuits.</p>	<ul style="list-style-type: none"> <li>• Using examples explain the differences among industrial power and residential wiring diagrams compared to electrance wiring diagrams.</li> <li>• Show industrial control wiring diagrams.</li> <li>• Students should be made to draw simple industrial control wiring.</li> <li>• List sketch and draw all common components and symbols used in power distributions diagrams.</li> <li>• Explain the differences between AC and DC motors.</li> <li>• Draw diagrams for various starting methods and explain how they operate.</li> <li>• Students should draw the circuit.</li> <li>• List and sketch protective devices, draw their symbols.</li> <li>• Students must know how to do same.</li> </ul>	<ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Drawing.</li> <li>• Chalkboard</li> </ul>
<b>General Objective 6.0: Electrical Building Construction Wiring Diagrams</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
7-9	<p>6.0 Explain the difference between schematic line diagrams.</p> <p>6.2 Explain how to read single line diagrams.</p> <p>6.3 Identify electrical symbols used in architectural plans.</p>	<ul style="list-style-type: none"> <li>• Draw schematic and single line diagrams and explain the difference between them.</li> <li>• Brochure single line diagram and show students how to read it.</li> <li>• List and draw an electrical symbols used in architectural plans.</li> </ul>	<ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Chalkboard</li> <li>• Single line diagram.</li> <li>• Chalkboard</li> <li>• List of electrical symbols drawing.</li> </ul>

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<b>General Objective 6.0: Electrical Building Construction Wiring Diagrams</b>			
<b>Week</b>	<b>Specific Learning Outcome:</b>	<b>Teachers Activities</b>	<b>Resources</b>
10-12	6.4 Explain how basic lighting circuits are wired. 6.5 Explain how to determine the wire size needed under different load conditions. 6.6 Develop proficiency in the design of and wiring of residential circuits.	<ul style="list-style-type: none"> <li>• Show how lighting circuits and power circuits are wired.</li> <li>Identify the difference between ring mains and radial wiring.</li> <li>• Explain advantages of ring over radial.</li> <li>• Show how to determine wire sizes under different load conditions.</li> <li>• Explain how to design and wire residential circuits or houses.</li> </ul>	<ul style="list-style-type: none"> <li>• Chalkboard</li> <li>• Plan of a house.</li> <li>• Chalkboard</li> <li>• Chalkboard</li> <li>• Plan of a house.</li> </ul>

## **EVALUATION GUIDE**

Students' Assessment should be based on assignments, tests, his ability to carry out projects on electrical design on building plans, reading of schematic diagrams and recognition of electronic and electrical component symbols.