REPUBLIC OF KENYA

NATIONAL OCCUPATIONAL STANDARDS

FOR

ELECTRICAL ENGINEERING TECHNICIAN (POWER OPTION)

KNQF LEVEL: 6

ISCED OCCUPATIONAL STANDARD CODE: 0713 554B

TVET CDACC
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NAIROBI

DEMONSTRATE UNDERSTANDING OF ELECTRONICS

UNIT CODE: ENG/OS/PO/CR/04/6/B

UNIT DESCRIPTION

This unit covers the competencies required to demonstrate understanding of Electronics. Competencies includes; Apply semiconductor theory, applying semiconductor diodes, demonstrating understanding of transistors, applying special semiconductor devices, performing rectification, applying amplifiers, demonstrating understanding of oscillators, applying wave shaping and pulse generation circuit and application of Opto-electronics.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements. ***(Bold and italicised terms are elaborated in the Range)***
1. Demonstrate understanding of semiconductor theory	1.1 Types of ***materials*** are established in line with semiconductor theory 1.2 Semiconductor materials are identified as per their electrical conductivity properties
2. Demonstrate understanding of semiconductor diodes	2.1 Types of diodes are identified as per their functionality 2.2 ***Diodes*** characteristics are determined as per their properties 2.3 Forward and reverse bias characteristics are established as per the properties of the semiconductor material
3. Demonstrate understanding of transistors	3.1. ***Transistors*** are identified as per their characteristics 3.2. NPN and PNP are determined as per their operation 3.3. P and N channels are identified as per their operation 3.4. ***Biasing*** and determination of gain of transistors is performed as per their standard operating procedure 3.5. Transistor configuration is performed as per their application

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4. Apply special semiconductor devices	4.1. Special semiconductor devices are identified as per their operation 4.2. Special semiconductors are applied as per their standard operating procedure 4.3 Types of special semiconductor devices are identified
5. Perform rectification	1.1 Types of rectifiers are identified as per their functions 1.2 Classes of rectifiers are identified as per their input voltage 1.3 Applications of rectifiers are established 1.4 Converters are identified as per their functions 1.5 Applications of converters are established as per their functions
2. Apply amplifiers	2.1 Types of ***amplifiers*** are identified as per their functions 2.2 Operational amplifier is identified as per its applications 2.3 Characteristics of operational amplifiers are determined
3. Demonstrate understanding of oscillators	7.1 ***Oscillators*** are classified as per their operation 7.2 Types of oscillators is determined as per their applications 7.3 Damped and Undamped oscillation is performed as per oscillator operation
4. Apply wave shaping and pulse generation circuit	4.1 Wave shaping and pulse generation circuits are performed as per their standard operating procedure
5. Apply opto-electronics	5.1 Types of Opt-electronics semiconductors are identified as per the operation characteristics 5.2 Diodes are classified as per their operation

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	**Range**
1. Materials may include but is not limited to:	• Insulators • Conductors • Semiconductors
2. Diodes may include but is not limited to:	• Photo diodes • Laser • Zener diodes • Light emitting diode • Schottky diodes
3. Transistors may include but is not limited to:	• BJTs • FETs
4. Biasing may include but is not limited to:	• Forward bias • Reverse bias
5. Amplifiers may include but is not limited to:	• RC coupled amplifiers • Small signal amplifiers • Power amplifiers • Tuned amplifier • Wide band amplifiers • Op-Amp amplifiers
6. Oscillators may include but is not limited to:	• Tuned collector • RC phase shift • Colpits

Variable	Range
	• Hartley • Crystal • Blocking

REQUIRED KNOWLEDGE AND UNDERSTANDING

- The manufacturer's warranty requirements relating to electrical installation systems and related components.
- The legal requirements relating to electrical installations
- Kenyan legislation and workplace procedures relevant to:
    - Health and safety;
    - Environment (including waste disposal);
    - Appropriate personal protective equipment (PPE).
- Work place communication;
- Time management
- Materials management
- The importance of documentation and keeping records
- The relationship between time and costs
- The importance of using the correct sources of technical information.
    - . Interpreting circuits, drawings, specifications and instructions
    - Preparing work plans in accordance with legislative and regulatory requirements and standard operating procedures and health and safety requirements
    - Importance of contractual agreements
    - Necessary insurance and policies including security bonds, performance bonds, contractors all risks
    - Insurance of contractors work
    - Keeping records of income
    - Financial statements

FOUNDATION SKILLS

- Communications (verbal and written);
- Proficient in logistic management;
- Time management;
- Meeting organization;
- Analytical
- Faults troubleshooting;
- Planning;
- Decision making;

- First aid;
- Report writing;
- Problem solving;
- Management

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and understanding and range.

1. Critical Aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Identified different semiconductor material 1.2 Demonstrated understanding in biasing of semiconductor materials 1.3 Identified special semiconductor devices 1.4 Performed forward and reverse biasing of semiconductor materials 1.5 Identified different types of transistors 1.6 Classified various types of oscillators 1.7 Identified various types of opto-electronics semiconductors
2. Resource Implications	The following resources must be provided: 2.1 Stationeries 2.2 Reference materials 2.3 Practical materials 2.4 Measuring instruments 2.5 Tools Resources the same as that of workplace are advised to be applied
3. Methods of Assessment	Competency may be assessed through: 3.1 Oral test 3.2 Written test 3.3 Observation 3.4 Practical demonstration
4. Context of Assessment	Competency may be assessed 1. On job 2. Off job 3. During Industrial Attachment

5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.