

REPUBLIC OF



KENYA

NATIONAL OCCUPATIONAL STANDARDS

FOR

ELECTRICAL OPERATOR (POWER OPTION)

KNQF LEVEL 5

ISCED CODE: 07130554 B



**TVET CDACC
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DEMONSTRATE UNDERSTANDING OF ELECTRONICS

UNIT CODE: ENG/OS/PO/CR/04/5/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, and Performing rectification.

ELEMENTS AND PERFORMANCE CRITERIA

| ELEMENT | PERFORMANCE CRITERIA |
|--|--|
| These describe the key outcomes which make up workplace function | These are assessable statements which specify the required level of performance for each of the elements <i>(Bold and italicised terms are elaborated in the Range)</i> |
| 1. Apply 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. Apply 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 |
| 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 |

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|--|--|
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| 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 |

RANGE

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

| Variable | Range |
|---|--|
| 1. Materials may include but is not limited to: | <ul style="list-style-type: none"> • Insulators • Conductors • Semiconductors |
| 2. Diodes may include but is not limited to: | <ul style="list-style-type: none"> • Photo diodes • Laser • Zener diodes • Light emitting diode • Schottky diodes |
| 3. Transistors may include but is not limited to: | <ul style="list-style-type: none"> • BJTs • FETs |
| 4. Biasing may include but is not limited to: | <ul style="list-style-type: none"> • Forward bias • Reverse bias |
| 5. Amplifiers may include but is not limited to: | <ul style="list-style-type: none"> • 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: | <ul style="list-style-type: none"> • Tuned collector • RC phase shift |

| Variable | Range |
|----------|---|
| | <ul style="list-style-type: none"> • Colpits • Hartley • Crystal • Blocking |

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required skills

The individual needs to demonstrate the following skills:

- Amplifier construction
- Communications (verbal and written);
- Proficient in ICT;
- Time management;
- Analytical
- Problem solving;
- Planning;
- Decision making;
- First aid;
- Electronics biasing

Required knowledge

The individual needs to demonstrate the following knowledge:

- The manufacturer's warranty requirements relating to electronic materials
- The legal and statutory requirements relating to Electronics
- workplace procedures relevant to:
 - Health and safety;
 - The environment (including waste disposal);
 - Appropriate personal and protective equipment;
- Workplace procedures for:
 - Appropriate use of tools and equipment
 - Electronics operations
 - Reporting of technical challenges
- The importance of documenting Electronics operations manuals
- The importance of working within agreed timelines and sharing progress reports.
- The relationship between time and costs.
- The importance of reporting anticipated delays to relevant parties promptly

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 Demonstrated understanding of rectification. |
| 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 individually in the actual workplace or through a simulated work place setting |
| 5. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |