

DEMONSTRATE UNDERSTANDING OF ELECTRONICS

UNIT CODE: ENG/OS/ET/CC/02/6/A

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 and demonstrating understanding of digital 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 <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
5. Perform rectification	5.1. Types of rectifiers are identified as per their functions 5.2. Classes of rectifiers are identified as per their input

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>
	voltage 5.3. Applications of rectifiers are established
6. Apply digital electronics	6.1. Number systems and their base conversions are determined as per standard operating procedure 6.2. Number system representation are performed in line with standard operating procedure 6.3. Boolean algebra is performed in accordance with established procedures 6.4. Logic gates are determined in line with standard operating procedures 6.5. Combination of logical circuits is performed as per in accordance with standard operating procedures 6.6. Flip flops are identified as their functionality 6.7. Registers are identified in accordance with their functionality 6.8. Counters are identified in line with standard operating procedure 6.9. Memories and programmable logic controllers are identified as per their functionality 6.10. Data communication is performed in line with communication requirements

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

Variable	Range
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 • Colpits • Hartley • Crystal • Blocking
7. Logic gates may include but is not limited to:	<ul style="list-style-type: none"> • AND gates • OR gates • NOR gates • NAND gates • XOR gates • XNOR gates

REQUIRED KNOWLEDGE AND UNDERSTANDING

- The individual needs to demonstrate knowledge and understanding of:
- 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
 - Number systems and conversions
 - 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.
- How to find, interpret and use sources of technical information for project activities
- The importance of using the correct sources of technical information.

FOUNDATION SKILLS

The individual needs to demonstrate the following foundation skills:

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

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 6.11. Demonstrated understanding of rectification basing on standard operating procedures 6.12. Determined number systems and their base conversions as per standard operating procedure 6.13. Performed number system representation in line with standard operating procedure 6.14. Performed Boolean algebra in accordance with established procedures 6.15. Determined logic gates in line with standard operating procedures 6.16. Performed combination of logical circuits as per in accordance with standard operating procedures 1.6 Identified flip flops as per their functionality 1.7 Identified counters and registers in line with standard operating procedure 1.8 Identified memories and programmable logic controllers as per their functionality 1.9 Performed data communication is in line with communication
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	requirements
2. Resource Implications	<p>The following resources must be provided:</p> <ul style="list-style-type: none"> 2.1 Stationeries 2.2 Reference materials 2.3 Practical materials 2.4 Measuring instruments 2.5 Tools <p>Resources the same as that of workplace are advised to be applied</p>
3. Methods of Assessment	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> 3.1 Oral test 3.2 Written test 3.3 Observation 3.4 Practical Tests
4. Context of Assessment	<p>Competency may be assessed</p> <ul style="list-style-type: none"> 4.1 On job 4.2 Off job 4.3 During industrial Attachment
5. Guidance information for assessment	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.</p>

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