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GOVERNMENT NOTICE

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

No. 521

26 April 2002



SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)

In accordance with regulation 24(c) of the National Standards Bodies Regulations of 28 March 1998, the Standards Generating Body (SGB) for

Electrical Engineering and Construction

Registered by NSB 12, Physical Planning and Construction, publishes the following unit standard for public comment.

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purpose of the unit standard upon which qualifications are based. Included are the qualification matrices. The unit standards can be accessed via the SAQA web-site at www.saga.org.za. Copies may also be obtained from the Directorate of Standards Setting and Development at the SAQA offices, 659 Pienaar street, Brooklyn, Pretoria.

Comment on the unit standards should reach SAQA at the address ***below and no later than 26 May 2002***. All correspondence should be marked **Standards Setting – SGB for Electrical Engineering and Construction** and addressed to

The Director: Standards Setting and Development
SAQA

Attention: Mr. D Mphuthing
Postnet Suite 248
Private Bag X06
Waterkloof
0145
or faxed to 012 – 482 0907

SAMUEL B.A. ISAACS
EXECUTIVE OFFICER

Unit Standards Titles

Unit Standards Titles at NQF 1

- Title 1:** Identify, inspect, use, maintain & care for engineering hand tools
- Title 2:** Apply and maintain safety in an electrical environment
- Title 3:** Install electrical wire ways
- Title 4:** Maintain electrical distribution boards & panels
- Title 5:** Select, use and care for power tools

Unit Standards Titles at NQF 2

- Title 1:** Design and construct single phase circuit
- Title 2:** Construct, commission & do fault tracing on low voltage reticulation networks
- Title 3:** Maintain & repair a high voltage security fence
- Title 4:** Install and/or replace an electrical metering / measuring instruments
- Title 5:** Install lighting systems
- Title 6:** Install low voltage transformers
- Title 7:** Jointing of low voltage cables
- Title 8:** Planning, installing & terminating, electrical cables & conductors
- Title 9:** Select, use & care for electrical measuring instruments

Unit Standards Titles at NQF 3

- Title 1:** Design & construction three phase circuit
- Title 2:** Commission single phase transformer
- Title 3:** Construct basic electronic circuits
- Title 4:** Design and install electrical wire ways
- Title 5:** Fault finding, testing & repair of domestic appliances
- Title 6:** Fault find, repair and maintain industrial electrical circuits
- Title 7:** Maintain lighting systems
- Title 8:** Install & commission electrical measuring instruments & control devices
- Title 9:** Install and commission single phase AC machines and control gear
- Title 10:** Maintain & repair three phase AC machines
- Title 11:** Maintain luminaires
- Title 12:** Maintain single phase AC machines & motor control gear
- Title 13:** Repair & maintain power tools

Title 14: Select, install, connect & commission three phase AC machines

Title 15: Wire & commission domestic electrical circuits

Title 16: Wire & commission industrial electrical circuits

Unit Standards Titles at NQF 4

Title 1: Diagnose & repair faults on low voltage transformers & equipment

Title 2: Inspection, testing, maintenance & commission hv transformers

Title 3: Maintain an AC or DC drive unit

Title 4: Repair three phase AC motor control gear

Unit Standards Titles and Specific Outcomes at NQF 5

Title 1: Auditing and specialised repairs on lighting systems

Title 2: Design lighting systems

Title 3: Surveying lighting systems

Unit Standards Titles and Specific Outcomes

Unit Standards Titles and Specific Outcomes at NQF 1

1. Title: Identify, inspect, use, maintain & care for engineering hand tools

Specific Outcome 1.1: Identify and select engineering hand tools

Specific Outcome 1.2: Inspection of engineering hand tools for serviceability

Specific Outcome 1.3: Use of engineering hand tools

Specific Outcome 1.4: Maintenance and care of engineering hand tools

2. Title: Apply and maintain safety in an electrical environment

Specific Outcome 2.1: Adhere to safety signs, regulations and procedures related to a working environment

Specific Outcome 2.2: Care for safety equipment

Specific Outcome 2.3: Follow appropriate safety procedures before, during and after job processes

Specific Outcome 2.4: Report and record safety anomalies in accordance with worksite procedures, statutory requirements and or manufacturers specifications

3. Title: Install electrical wire ways

Specific Outcome 3.1: Planning to install electrical wire ways

Specific Outcome 3.2: Prepare to install electrical wire ways

Specific Outcome 3.3: Install Electrical Wire Ways

Specific Outcome 3.4: Complete the installation of wire ways

4. Title: Maintain electrical distribution boards & panels

Specific Outcome 4.1: Plan to maintain distribution boards and panels

Specific Outcome 4.2: Prepare to maintain distribution boards and panels

Specific Outcome 4.3: Maintain electrical distribution boards and panels

Specific Outcome 4.4: Conclude the maintenance of electrical distribution board and panel

5. Title: Select, use and care for power tools

Specific Outcome 5.1: Select a power tool pertaining to specific job requirements

Specific Outcome 5.2: Use fixed power tools

Specific Outcome 5.3: Use portable power tools

Specific Outcome 5.4: Caring for and storing of power tools and their accessories

Unit Standards Titles and Specific Outcomes at NQF 2

1. Title: Design and construct single phase circuit

Specific Outcome 1.1: Identify symbols and components

Specific Outcome 1.2: Sketch a basic circuit diagram

Specific Outcome 1.3: Construct single-phase circuits.

Specific Outcome 1.4: Complete task

2. Title: Construct, commission & do fault tracing on low voltage reticulation networks

Specific Outcome 2.1: Plan work task

Specific Outcome 2.2: Construct low voltage network

Specific Outcome 2.3: Commission low voltage reticulation networks

Specific Outcome 2.4: Fault tracing on low voltage reticulation networks

Specific Outcome 2.5: Complete work tasks

3. Title: Maintain & repair a high voltage security fence

Specific Outcome 3.1: Plan and prepare to maintain a high voltage security fence

Specific Outcome 3.2: Inspect and clean a high voltage security fence

Specific Outcome 3.3: Repair, replace and rectify defects on a high voltage security fence

Specific Outcome 3.4: Re-commission and complete work on a high voltage security fence

4. Title: Install and/or replace an electrical metering / measuring instrument

Specific Outcome 4.1: Plan to Install and/or replace an electrical metering / measuring instruments

Specific Outcome 4.2: Install a metering/Measuring instrument on a panel

Specific Outcome 4.3: Replace a metering/Measuring instrument on a panel

Specific Outcome 4.4: Complete the Installing and/or replacing of a metering/Measuring instrument on a panel

5. Title: Install lighting systems

Specific Outcome 5.1: Explain the requirements pertaining to the selection and methods of installation

Specific Outcome 5.2: Prepare to install a lighting system

Specific Outcome 5.3: Install the lighting system

Specific Outcome 5.4: Prepare and test the lighting system for operation

6. Title: Install low voltage transformers

Specific Outcome 6.1: Plan to install low voltage transformers

Specific Outcome 6.2: Prepare to install low voltage transformers

Specific Outcome 6.3: Install low voltage transformers

Specific Outcome 6.4: Complete the installation of low voltage transformers

7. Title: Jointing of low voltage cables

Specific Outcome 7.1: Planning related to the jointing task

Specific Outcome 7.2: Prepare the work area

Specific Outcome 7.3: Joint low voltage cables

Specific Outcome 7.4: Testing of low voltage cables

Specific Outcome 7.5: Complete the work task

8. Title: Planning, installing & terminating, electrical cables & conductors

Specific Outcome 8.1: Plan to install electrical cables and conductors

Specific Outcome 8.2: Prepare to install electrical cables and conductors

Specific Outcome 8.3: Install electrical cables and conductors

Specific Outcome 8.4: Terminate electrical cables/conductors

Specific Outcome 8.5: Complete work task

9. Title: Select, use & care for electrical measuring instruments

Specific Outcome 9.1: Identify and read fixed electrical measuring instruments

Specific Outcome 9.2: Identify and select portable electrical measuring instruments

Specific Outcome 9.3: Use and interpret portable electrical measuring instruments

Specific Outcome 9.4: Care for portable electrical measuring instruments

Unit Standards Titles and Specific Outcomes at NQF 3

1. Title: Design & construction three phase circuit

Specific Outcome 1.1: Identify symbols and components

Specific Outcome 1.2: Sketch a basic circuit diagram

Specific Outcome 1.3: Construct three phase circuits

Specific Outcome 1.4: Complete task

2. Title: Commission single phase transformer

Specific Outcome 2.1: Plan work task

Specific Outcome 2.2: Prepare work area

Specific Outcome 2.3: Commission single phase transformer

Specific Outcome 2.4: Complete Work Task

3. Title: Construct basic electronic circuits**Specific Outcome 3.1:** Plan to construct basic electronic circuit**Specific Outcome 3.2:** Construct basic electronic circuits**Specific Outcome 3.3:** Test and commission the circuit**Specific Outcome 3.4:** Complete work task**4. Title:** Design and install electrical wire ways**Specific Outcome 4.1:** Planning to install electrical wire ways**Specific Outcome 4.2:** Prepare to install electrical wire ways**Specific Outcome 4.3:** Install electrical wire ways**Specific Outcome 4.4:** Complete the installation of wire ways**5. Title:** Fault finding, testing & repair of domestic appliances**Specific Outcome 5.1:** Plan to do fault finding and repair to domestic appliances**Specific Outcome 5.2:** Fault finding and testing domestic appliances**Specific Outcome 5.3:** Repairing domestic appliances**Specific Outcome 5.4:** Conclude appliance repair**6. Title:** Fault find, repair and maintain industrial electrical circuits**Specific Outcome 6.1:** Plan to maintain industrial electrical circuits**Specific Outcome 6.2:** Prepare to maintain industrial electrical circuits**Specific Outcome 6.3:** Find and repair faults on industrial electrical circuits**Specific Outcome 6.4:** Maintain industrial electrical circuits**Specific Outcome 6.5:** Complete the work task**7. Title:** Maintain lighting systems**Specific Outcome 7.1:** Explain the requirements pertaining to maintaining lighting systems**Specific Outcome 7.2:** Prepare to maintain a lighting system**Specific Outcome 7.3:** Maintain lighting systems**Specific Outcome 7.4:** Prepare and test the maintained lighting systems for operation

8. Title: Install & commission electrical measuring instruments & control devices

Specific Outcome 8.1: Explain the requirements pertaining to install electrical measuring instruments and control devices

Specific Outcome 8.2: Plan to install and connect electrical measuring instruments with their relative control devices

Specific Outcome 8.3: Prepare, install and connect electrical measuring instruments and control devices

Specific Outcome 8.4: Commission electrical measuring instruments

Specific Outcome 8.5: Complete work activity

9. Title: Install and commission single phase AC machines and control gear

Specific Outcome 9.1: Plan task and select single phase AC machines and control gear

Specific Outcome 9.2: Install single phase A.C. machines and control gear

Specific Outcome 9.3: Connect single phase A.C. machines and control gear

Specific Outcome 9.4: Commission single phase AC Machines

10. Title: Maintain & repair three phase AC machines

Specific Outcome 10.1: Plan to repair and maintain three phase AC machines

Specific Outcome 10.2: Prepare to repair and maintain three phase AC machines

Specific Outcome 10.3: Maintain three phase AC machines and control gear

Specific Outcome 10.4: Complete maintenance on three phase AC machines and control gear

11. Title: Maintain luminaires

Specific Outcome 11.1: Explain the requirements pertaining to maintaining luminaires

Specific Outcome 11.2: Prepare to maintain a luminaire

Specific Outcome 11.3: Maintain luminaires

Specific Outcome 11.4: Prepare and test the maintained luminaires for operation

12. Title: Maintain single phase AC machines & motor control gear

Specific Outcome 12.1: Plan to maintain single phase AC machines and control gear

- Specific Outcome 12.2:** Prepare to maintain single phase AC machines and control gear
- Specific Outcome 12.3:** Fault finding on single phase AC machines and control gear
- Specific Outcome 12.4:** Maintain single phase AC machines and control gear
- Specific Outcome 12.5:** Complete the work task

13. Title: Repair & maintain power tools

- Specific Outcome 13.1:** Plan to repair and maintain power tools
- Specific Outcome 13.2:** Prepare to repair and maintain power tools
- Specific Outcome 13.3:** Testing and fault finding on power tools
- Specific Outcome 13.4:** Repair and maintain power tools
- Specific Outcome 13.5:** Completion of repairs and maintenance to power tools

14. Title: Select, install, connect & commission three phase AC machines

- Specific Outcome 14.1:** Plan to install, connect and commission three phase AC machines and control gear
- Specific Outcome 14.2:** Prepare to install, connect and commission three phase AC machines and control gear
- Specific Outcome 14.3:** Install three phase A.C. machines and control gear
- Specific Outcome 14.4:** Connect three phase A.C. machines and control gear
- Specific Outcome 14.5:** Commission three phase AC machines and control gear
- Specific Outcome 14.6:** Complete installation, connection and commissioning of three phase AC machines and control gear

15. Title: Wire & commission domestic electrical circuits

- Specific Outcome 15.1:** Plan to wire and commission domestic circuits
- Specific Outcome 15.2:** Prepare to wire and commission domestic circuits
- Specific Outcome 15.3:** Wire domestic circuits
- Specific Outcome 15.4:** Commission domestic circuits
- Specific Outcome 15.5:** Complete the wiring and commissioning of domestic circuits

16. Title: Wire & commission industrial electrical circuits

- Specific Outcome 16.1:** Plan work task

- Specific Outcome 16.2:** Wire industrial electrical circuits
Specific Outcome 16.3: Commission industrial electrical circuits
Specific Outcome 16.4: Complete work task

Unit Standards Titles and Specific Outcomes at NQF 4

1. Title: Diagnose & repair faults on low voltage transformers & equipment

- Specific Outcome 1.1:** Plan to diagnose and repair low voltage transformers
Specific Outcome 1.2: Prepare work area
Specific Outcome 1.3: Diagnose and repair faults on low voltage transformers
Specific Outcome 1.4: Complete work task

2. Title: Inspection, testing, maintenance & commission hv transformers

- Specific Outcome 2.1:** Plan and prepare for inspection, testing, maintenance & commissioning of high voltage Transformers
Specific Outcome 2.2: Prepare the high voltage transformer for inspection, tests, maintenance and commissioning
Specific Outcome 2.3: Carry out inspection and tests on High voltage transformers
Specific Outcome 2.4: Carry out maintenance on High voltage transformer
Specific Outcome 2.5: Perform function tests and pre-service checks
Specific Outcome 2.6: Commissioning & complete all tasks on Transformer

3. Title: Maintain an AC or DC drive unit

- Specific Outcome 3.1:** Plan and prepare to maintain an AC or DC drive unit
Specific Outcome 3.2: Inspect and clean an AC or DC drive unit
Specific Outcome 3.3: Repair, replace and rectify defects on an AC or DC drive
Specific Outcome 3.4: Recommission and complete work on an AC or DC drive unit

4. Title: Repair three phase AC motor control gear

- Specific Outcome 4.1:** Follow safety procedures before, during and after fault finding and repair of a three phase motor control gear
Specific Outcome 4.2: Fault find and repair faults on a three phase motor control gear
Specific Outcome 4.3: Record and report faults on a three phase motor control gear

Unit Standards Titles and Specific Outcomes at NQF 5**1. Title: Auditing and specialised repairs on lighting systems****Specific Outcome 1.1: Plan work task****Specific Outcome 1.2: Prepare work areas****Specific Outcome 1.3: Audit lighting systems****Specific Outcome 1.4: Perform specialist repairs****Specific Outcome 1.5: Completed Activity****2. Title: Design lighting systems****Specific Outcome 2.1: Plan and prepare work activity****Specific Outcome 2.2: Design a lighting system****Specific Outcome 2.3: Write maintenance schedules****Specific Outcome 2.4: Write maintenance procedures****Specific Outcome 2.5: Complete the work task****3. Title: Surveying lighting systems****Specific Outcome 3.1: Plan and prepare work activity****Specific Outcome 3.2: Surveying a lighting system****Specific Outcome 3.3: Write a surveying report****Specific Outcome 3.4: Complete the work task**

**ELECTRICAL UNIT STANDARDS FOR THE GENERAL EDUCATION AND TRAINING
CERTIFICATE IN BASIC TECHNICAL PRACTICE (ENERGY 01) AND NATIONAL
CERTIFICATE IN ELECTRICAL ENGINEERING LEVEL 02-04 FOR GAZETTING BY THE
SGB FOR ELECTRICAL ENGINEERING AND CONSTRUCTION UNDER NSB 12**

Mining specific Electrical Engineering

Unit standards Titles, NQF Levels and Credits

US Number	Unit Standard Title	Level	Credit
1.	Carry out a close inspection and clean a transformer	1	1
2.	Carry out a closed inspection on a flameproof enclosure	1	1
3.	Carry out a detailed inspection on an electrical blasting box	1	1
4.	Install an electrical blasting box	1	1
5.	Carry out a detailed inspection of an auto electrical system on a self-propelled mobile machine	2	5
6.	Carry out a detailed inspection on a DC motor	2	3
7.	Carry out a detailed inspection on a flameproof enclosure	2	2
8.	Carry out a detailed inspection on an electrical motor	2	3
9.	Carry out a detailed inspection on enhanced safety apparatus	2	3
10.	Connect a flameproof plug to a trailing cable	2	3
11.	Connect a welding plug	2	3
12.	Disconnect and connect an electric motor	2	3
13.	Inspect and clean a battery operated tripping unit	2	2
14.	Inspect and clean a distribution board	2	3
15.	Inspect and clean a gully box	2	2
16.	Inspect and clean an electrical enclosure	2	2
17.	Install a conveyor pull wire system	2	3
18.	Install a distribution board	2	2
19.	Install a flitting panel	2	3
20.	Install a gully box	2	2
21.	Install a lighting system	2	4
22.	Install a low voltage gate end box	2	2
23.	Install a shaft signalling system	2	2
24.	Install a straining wire cable support system	2	2
25.	Install a welding socket outlet	2	3
26.	Install an electrical cable	2	3
27.	Install an electrical signalling device for scraper winches	2	3
28.	Install an overhead trolley line in an underground haulage	2	6
29.	Install earthing and bonding on electrical installations	2	2
30.	Install or replace an earth leakage unit in a low voltage circuit	2	3
31.	Isolate and restore power to an electrical system	2	2
32.	Maintain a cam operated DC motor controller	2	5
33.	Maintain a drum type continuous mining machine	2	5
34.	Maintain a roadheader	2	5

35.	Maintain a shaft communication system	2	1
36.	Maintain a shaft signalling system	2	1
37.	Maintain a wall mining shearer	2	5
38.	Maintain an overhead trolley line in an underground haulage	2	7
39.	Maintain intrinsically safe apparatus	2	2
40.	Perform a detailed inspection on a self-propelled battery powered mobile machine	2	3
41.	Repair a battery-powered locomotive	2	7
42.	Repair a flitting panel	2	4
43.	Repair a lighting system	2	2
44.	Repair a trackless, self-propelled, battery powered mobile machine	2	7
45.	Repair an emergency pull wire system	2	3
46.	Replace a trailing cable on trackless and track driven mining machines	2	2
47.	Replace an electrical cable	2	3
48.	Replace an electrical cable on mining production machines	2	3
49.	Replace faulty components in a distribution board	2	3
50.	Restore power by joining a low voltage electrical cable	2	4
51.	Switch a high voltage inline switch on and off	2	2
52.	Terminate and connect a low voltage cable to a source of supply	2	3
53.	Test a three-phase low voltage induction motor	2	2
54.	Use and care for hand held electrical test instruments	2	3
55.	Advance or retreat electrical reticulation in an underground coal section	3	6
56.	Carry out a detailed inspection on high voltage switchgear	3	7
57.	Change tap settings on a three-phase transformer	3	3
58.	Connect and commission a 3 phase direct on line motor control system	3	6
59.	Identify the correct phase sequence on high voltage transformers and cables	3	3
60.	Install a low voltage supply system in an underground working	3	5
61.	Install a thyristor speed control unit for a DC trackless machine	3	6
62.	Install an electronic control unit for AC pole changing motors	3	6
63.	Isolate and restore power to a high voltage electrical system	3	4
64.	Repair a shaft signalling system	3	3
65.	Repair a thyristor speed control system for a DC trackless machine	3	6
66.	Repair an electronic control system for AC traction on a trackless machine	3	6
67.	Repair an electronic controller on a battery-operated machine	3	5
68.	Replace a 3 phase electrical motor between 5,5 kW and 75 kW	3	3
69.	Restore power by joining a high voltage electrical cable	3	6
70.	Test, diagnose and locate a fault on a high voltage electrical cable	3	9
71.	Repair a drum type continuous mining machine	4	10
72.	Repair a roadheader	4	10
73.	Repair a wall mining shearer	4	10

Unit standards Titles and Specific Outcomes**Unit standards Titles at NQF 01****1. Title: Carry out a close inspection and clean a transformer.**

- SO. 1 Explain the requirements pertaining to the cleaning and the use of cleaning materials and equipment.
- SO. 2 Prepare to carry out the close inspection and clean the transformer.
- SO. 3 Carry out the close inspection and clean the transformer.
- SO. 4 Perform reporting and housekeeping duties.

2. Title: Carry out a closed inspection on a flameproof enclosure.

- SO. 1 Explain the requirements pertaining to a closed inspection on flameproof enclosures.
- SO. 2 Prepare to inspect the enclosure.
- SO. 3 Inspect the enclosure.
- SO. 4 Perform reporting and good housekeeping duties.

3. Title: Carry out a detailed inspection of an auto electrical system on a self-propelled mobile machine.

- SO. 1 Explain the requirements pertaining to the inspection of an auto electrical system on a self-propelled mobile machine.
- SO. 2 Prepare to inspect an auto electrical system on a self-propelled mobile machine.
- SO. 3 Inspect the auto electrical system.
- SO. 4 Test the auto electrical system and prepare for operation.

4. Title: Carry out a detailed inspection on an electrical blasting box.

- SO. 1 Explain the requirements pertaining to inspecting a blasting box.
- SO. 2 Prepare to inspect the blasting box.
- SO. 3 Inspect the blasting box.
- SO. 4 Prepare and test the blasting box for operation.

5. Title: Install an electrical blasting box.

- SO. 1 Explain the requirements pertaining to the installation of a blasting box.
- SO. 2 Prepare to install the blasting box.
- SO. 3 Install the blasting box.
- SO. 4 Prepare and test the blasting box.

Unit standards Titles at NQF 02**1. Title: Carry out a detailed inspection on a DC motor.**

- SO. 1 Explain the requirements pertaining to the inspection of a DC motor.
- SO. 2 Prepare to inspect a DC motor.
- SO. 3 Inspect the DC motor.
- SO. 4 Prepare and test the DC motor for operation.

2. Title: Carry out a detailed inspection on a flameproof enclosure.

- SO. 1 Explain the principals of a flameproof enclosure.

- SO. 2 Prepare to inspect the enclosure.
- SO. 3 Inspect the enclosure.
- SO. 4 Restore the enclosure to operational status.

3. Title: Carry out a detailed inspection on an electrical motor.

- SO. 1 Explain the requirements pertaining to the inspection of an AC motor.
- SO. 2 Prepare to inspect the motor.
- SO. 3 Inspect the motor.
- SO. 4 Prepare and test the motor for operation.

4 Title: Carry out a detailed inspection on enhanced safety apparatus.

- SO. 1 Explain the principals of enhanced safety apparatus.
- SO. 2 Prepare to inspect enhanced safety apparatus.
- SO. 3 Inspect enhanced safety apparatus.
- SO. 4 Prepare and test the apparatus for operation.

5. Title: Connect a flameproof plug to a trailing cable.

- SO. 1 Explain the requirements pertaining to connecting a flameproof plug to a trailing cable.
- SO. 2 Prepare to connect the plug.
- SO. 3 Connect the plug.
- SO. 4 Test the plug and perform reporting and good housekeeping practices.

6. Title: Connect a welding plug.

- SO. 1 Explain the requirements pertaining to connecting a welding plug.
- SO. 2 Prepare to connect the plug.
- SO. 3 Connect the plug.
- SO. 4 Test the welding plug and apply housekeeping practices.

7. Title: Disconnect and connect an electric motor.

- SO. 1 Explain the requirements pertaining to disconnecting and connecting electric motors.
- SO. 2 Prepare to disconnect and connect an electric motor.
- SO. 3 Disconnect an electric motor.
- SO. 4 Connect an electric motor.
- SO. 5 Test an electric motor and apply good housekeeping practices.

8. Title: Inspect and clean a battery operated tripping unit.

- SO. 1 Explain the operation and testing of lead-acid and alkaline batteries.
- SO. 2 Prepare to inspect and clean.
- SO. 3 Inspect and clean the unit.
- SO. 4 Restore power and apply housekeeping practices.

9. Title: Inspect and clean a distribution board.

- SO. 1 Explain the requirements pertaining to the cleaning and the use of cleaning materials and equipment.
- SO. 2 Prepare to inspect and clean the distribution board.
- SO. 3 Inspect and clean the distribution board.
- SO. 4 Prepare and test the distribution board for operation.

10. Title: Inspect and clean a gully box.

- SO. 1 Explain the requirements pertaining to the cleaning and the use of cleaning materials and equipment.
- SO. 2 Prepare to inspect and clean the gully box.
- SO. 3 Inspect and clean the gully box.
- SO. 4 Prepare and test the gully box for operation.

11. Title: Inspect and clean an electrical enclosure.

- SO. 1 Explain the requirements pertaining to the cleaning and the use of cleaning materials and equipment.
- SO. 2 Prepare to inspect and clean the electrical enclosure.
- SO. 3 Inspect and clean the electrical enclosure.
- SO. 4 Restore power and apply good housekeeping practices.

12. Title: Install a conveyor pull wire system.

- SO. 1 Explain the requirements pertaining to the installation of a conveyor pull wire system.
- SO. 2 Prepare to install the conveyor pull wire system.
- SO. 3 Install the conveyor pull wire system.
- SO. 4 Prepare and test the conveyor pull wire system for operation.

13. Title: Install a distribution board.

- SO. 1 Explain the requirements pertaining to the installation of a distribution board.
- SO. 2 Prepare to install the distribution board.
- SO. 3 Install the distribution board.
- SO. 4 Prepare and test the distribution board.

14. Title: Install a flitting panel.

- SO. 1 Explain the requirements pertaining to the installation of a flitting panel.
- SO. 2 Prepare to install the flitting panel.
- SO. 3 Install the flitting panel.
- SO. 4 Test and commission the flitting panel.

15. Title: Install a gully box.

- SO. 1 Explain the requirements pertaining to the installation of a gully box.
- SO. 2 Prepare to install the gully box.
- SO. 3 Install the gully box.
- SO. 4 Prepare and test the gully box.

16. Title: Install a lighting system.

- SO. 1 Explain the requirements pertaining to the selection and methods of installation.
- SO. 2 Prepare to install a lighting system.
- SO. 3 Install the lighting system.
- SO. 4 Prepare and test the lighting system.

16. Title: Install a low voltage gate end box.

- SO. 1 Explain the requirements pertaining to the installation of a gate end box.
- SO. 2 Prepare to install the gate end box.
- SO. 3 Install the gate end box.
- SO. 4 Prepare and test the gate end box for operation.

17. Title: Install a shaft signalling system

- SO. 1 Explain the requirements pertaining to the installation of a shaft signalling system
- SO. 2 Prepare to install the shaft signalling system
- SO. 3 Install the shaft signalling system
- SO. 3 Complete the shaft signalling system installation

18. Title: Install a straining wire cable support system.

- SO. 1 Explain the installation of a straining wire cable support system.
- SO. 2 Prepare to install a straining wire cable support system.
- SO. 3 Install the straining wire cable support system.
- SO. 4 Prepare installation for operation.

19. Title: Install a welding socket outlet.

- SO. 1 Explain the requirements pertaining to the installation of a welding socket outlet.
- SO. 2 Prepare to install the socket outlet.
- SO. 3 Install the socket outlet.
- SO. 4 Test the welding socket outlet and apply housekeeping practices.

20. Title: Install an electrical cable.

- SO. 1 Describe the requirements pertaining to the installation, handling and securing of cables.
- SO. 2 Prepare to install a cable.
- SO. 3 Install the cable.
- SO. 4 Perform reporting and housekeeping duties.

21. Title: Install an electrical signalling device for scraper winches.

- SO. 1 Explain the requirements pertaining to the installation of an electrical signalling device for scraper winches.
- SO. 2 Prepare to install the signalling device.
- SO. 3 Install the signalling device.
- SO. 4 Test the device and apply good housekeeping practices.

22. Title: Install an overhead trolley line in an underground haulage.

- SO. 1 Explain the requirements pertaining to the installation of an overhead trolley line.
- SO. 2 Prepare to install an overhead trolley line.
- SO. 3 Install an overhead trolley line.
- SO. 4 Test the installation and apply good housekeeping practices.

23. Title: Install earthing and bonding on electrical installations.

- SO. 1 Explain the requirements pertaining to earthing and bonding.
- SO. 2 Prepare to install an earthing and bonding system.
- SO. 3 Install earthing and bonding.

SO. 4 Restore power and test earthing and bonding system.

24. Title: Install or replace an earth leakage unit in a low voltage circuit.

SO. 1 Explain the principles related to earth leakage units.

SO. 2 Prepare to install an earth leakage unit.

SO. 3 Install an earth leakage unit.

SO. 4 Restore equipment to operational status.

25. Title: Isolate and restore power to an electrical system.

SO. 1 Explain the procedures and terms related to isolation and power restoration.

SO. 2 Prepare to isolate.

SO. 3 Isolate the circuit.

SO. 4 Restore power to the system.

26. Title: Maintain a cam operated DC motor controller.

SO. 1 Explain the requirements pertaining to the maintenance of a cam operated DC motor controller.

SO. 2 Prepare to maintain the controller.

SO. 3 Maintain the controller.

SO. 4 Prepare and test the controller for operation.

25. Title: Maintain a drum type continuous mining machine.

SO. 1 Explain the requirements pertaining to the maintenance of a drum type continuous miner.

SO. 2 Prepare to maintain the continuous miner.

SO. 3 Maintain the continuous miner.

SO. 4 Restore the continuous miner to operational status.

26. Title: Maintain a roadheader.

SO. 1 Explain the requirements pertaining to the maintenance of a roadheader.

SO. 2 Prepare to maintain the roadheader.

SO. 3 Maintain the roadheader.

SO. 4 restore the roadheader to operational status.

27. Title: Maintain a shaft communication system.

SO. 1 Explain the requirements pertaining to the maintenance of a shaft communication system.

SO. 2 Prepare to maintain the shaft communication system.

SO. 3 Maintain the shaft communication system.

SO. 4 Prepare the shaft communication system for operation.

28. Title: Maintain a shaft signaling system.

SO. 1 Explain the requirements pertaining to cleaning and the use of cleaning materials and equipment.

SO. 2 Prepare to maintain the shaft signalling system.

SO. 3 Maintain the shaft signalling system.

SO. 4 Prepare and test the shaft signalling system for operation.

29. Title: Maintain a wall mining shearer

- SO. 1 Explain the requirements pertaining to the maintenance of a wall mining shearer.
- SO. 2 Prepare to maintain the wall mining shearer.
- SO. 3 Maintain the wall mining shearer.
- SO. 3 Restore the wall mining shearer to operational status.

30. Title: Maintain an overhead trolley line in an underground haulage.

- SO. 1 Explain the requirements when maintaining an overhead trolley line.
- SO. 2 Prepare to maintain an overhead trolley line.
- SO. 3 Maintain an overhead trolley line.
- SO. 4 Restore power and apply good housekeeping practices.

31. Title: Maintain intrinsically safe apparatus.

- SO. 1 Explain the principles of intrinsically safe apparatus.
- SO. 2 Prepare to maintain intrinsically safe apparatus.
- SO. 3 Maintain intrinsically safe apparatus.
- SO. 4 Restore apparatus to operational status.

32. Title: Perform a detailed inspection on a self-propelled battery powered mobile machine.

- SO. 1 Explain the requirements pertaining to the inspection of a battery powered mobile machine
- SO. 2 Prepare to inspect the machine
- SO. 3 Inspect the machine
- SO. 4 Prepare and test the machine for operation

33. Title: Repair a battery-powered locomotive.

- SO. 1 Explain the requirements for repairs carried out on a locomotive.
- SO. 2 Prepare to repair the locomotive.
- SO. 3 Test, diagnose and locate the fault.
- SO. 4 Repair the fault.
- SO. 5 Restore the locomotive to operational status.

34. Title: Repair a flitting panel.

- SO. 1 Explain the requirements pertaining to faultfinding on a flitting panel.
- SO. 2 Prepare to repair the flitting panel.
- SO. 3 Test, diagnose and locate the fault.
- SO. 4 Repair the fault.
- SO. 5 Test and apply good housekeeping practices.

35. Title: Repair a lighting system.

- SO. 1 Explain the requirements pertaining to repairing lighting system.
- SO. 2 Prepare to repair the lighting system.
- SO. 3 Repair the lighting system.
- SO. 4 Test the lighting system.

36. Title: Repair a trackless, self-propelled, battery powered mobile machine.

- SO. 1 Explain the requirements for repairs carried out on the mobile machine.
- SO. 2 Prepare to repair the mobile machine.
- SO. 3 Test, diagnose and locate the fault.
- SO. 4 Repair the fault.
- SO. 5 Restore the mobile machine to operational status.

37. Title: Replace a trailing cable on trackless and track driven mining machines.

- SO. 1 Describe the requirements pertaining to the replacement of trailing cables.
- SO. 2 Prepare to replace the cable.
- SO. 3 Replace the cable.
- SO. 3 Test and apply housekeeping practices.

38. Title: Repair an emergency pull wire system.

- SO. 1 Explain the requirements pertaining to the repairing of an emergency pull wire system.
- SO. 2 Prepare to repair an emergency pull wire system.
- SO. 3 Test, diagnose and locate the fault.
- SO. 4 Repair the emergency pull wire system.
- SO. 5 Test and apply housekeeping duties.

39. Title: Replace an electrical cable.

- SO. 1 Describe the requirements pertaining to the replacing, and securing of cables.
- SO. 2 Prepare to replace the cable.
- SO. 3 Replace the cable.
- SO. 4 Prepare and test for operation.

40. Title: Replace an electrical cable on mining production machines.

- SO. 1 Describe the requirements pertaining to the identification, removing, replacing and handling of a cable.
- SO. 2 Prepare to replace the cable.
- SO. 3 Replace the cable.
- SO. 4 Perform reporting and housekeeping duties.

41. Title: Replace faulty components in a distribution board.

- SO. 1 Explain the requirements pertaining to the replacement of faulty components.
- SO. 2 Prepare to replace the faulty component.
- SO. 3 Replace the component.
- SO. 4 Test the distribution board and apply good house keeping practices.

42. Title: Restore power by joining a low voltage electrical cable.

- SO. 1 Explain the requirements pertaining to joining cables.
- SO. 2 Prepare to join the cable.
- SO. 3 Join the cable.
- SO. 4 Test the cable and restore power.

43. Title: Switch a high voltage inline switch on and off.

- SO. 1 Explain the procedures and terms related to switching a high voltage inline switch.
- SO. 2 Prepare to switch.
- SO. 3 Switch and perform reporting duties.

44. Title: Terminate and connect a low voltage cable to a source of supply filter.

- SO. 1 Explain the requirements for the termination and connecting of cable ends.
- SO. 2 Prepare to terminate and connect the cable end.
- SO. 3 Terminate and connect the cable end.
- SO. 4 Prepare and test the equipment for operation.

45. Title: Test a three-phase low voltage induction motor.

- SO. 1 Describe the requirements pertaining to testing a three-phase induction motor.
- SO. 2 Prepare to test the motor.
- SO. 3 Test the motor.
- SO. 4 Perform reporting and housekeeping duties.

46. Title: Use and care for hand held electrical test instruments.

- SO. 1 Explain theoretical knowledge of the principles related to the use of hand held electrical test instruments.
- SO. 2 Care for hand held electrical test instruments.
- SO. 3 Use hand held electrical test instruments.

Unit standards Titles at NQF 03**1. Title: Advance or retreat electrical reticulation in an underground coal section.**

- SO. 1 Explain the requirements pertaining to flameproof integrity and safety.
- SO. 2 Prepare to advance or retreat electrical reticulation.
- SO. 3 Advance or retreat electrical reticulation.
- SO. 4 Restore power and test equipment for operation.

2. Title: Carry out a detailed inspection on high voltage switchgear.

- SO. 1 Explain the requirements of a detailed inspection on high voltage switchgear.
- SO. 2 Prepare to inspect the switchgear.
- SO. 3 Inspect the switchgear.
- SO. 4 Test, report and perform good housekeeping duties.

3. Title: Change tap settings on a three-phase transformer.

- SO. 1 Explain the requirements pertaining to tap changing.
- SO. 2 Prepare to change tap settings.
- SO. 3 Change tap settings.
- SO. 4 Restore power and apply good housekeeping practices.

4. Title: Connect and commission a 3 phase direct on line motor control system.

- SO1 Explain the requirements pertaining to the connection and commissioning of a 3 phase direct on line motor control system.
- SO 2 Prepare to connect a 3 phase direct on line motor control system.

- SO 3 Connect a 3 phase direct on line motor control system.
- SO 4 Test and commission a 3 phase direct on line motor control system.

5. Title: Identify the correct phase sequence on high voltage transformers and cables

- SO. 1 Explain the requirements pertaining to high voltage phasing.
- SO. 2 Prepare for phasing.
- SO. 3 Carry out the phasing operation.
- SO. 4 Restore power and apply housekeeping practices.

6. Title: Install a low voltage supply system in an underground working.

- SO. 1 Explain low voltage supply system installations.
- SO. 2 Prepare to install a low voltage supply system.
- SO. 3 Install a low voltage supply system.
- SO. 4 Complete the power restoration process.

7. Title: Install a thyristor speed control unit for a DC trackless machine.

- SO. 1 Explain the requirements pertaining to the installation of a thyristor speed control unit for a DC trackless machine.
- SO. 2 Prepare to install the thyristor speed control unit.
- SO. 3 Install the thyristor speed control unit.
- SO. 4 Test the thyristor speed control unit and apply housekeeping duties.

8. Title: Install an electronic control unit for AC pole changing motors.

- SO. 1 Explain the requirements pertaining to installing the electronic control unit
- SO. 2 Prepare to install the electronic control unit.
- SO. 3 Install the electronic control unit.
- SO. 4 Test the electronic control unit and apply housekeeping duties.

9. Title: Isolate and restore power to a high voltage electrical system.

- SO. 1 Explain the procedures and terms related to isolation and power restoration.
- SO. 2 Prepare to isolate.
- SO. 3 Isolate the system.
- SO. 4 Restore power to the system

10. Title: Repair a shaft signalling system.

- SO. 1 Explain the requirements pertaining to fault finding on a shaft signalling system.
- SO. 2 Prepare to repair a shaft signalling system.
- SO. 3 Test, diagnose and locate the fault.
- SO. 4 Repair the fault.
- SO. 5 Restore the shaft signalling system to operational status.

11. Title: Repair a thyristor speed control system for a DC trackless machine.

- SO. 1 Explain the requirements for faultfinding and repairs on a thyristor speed control system.
- SO. 2 Prepare to repair the thyristor speed control system.
- SO. 3 Test, diagnose and locate the fault.
- SO. 4 Repair the fault.
- SO. 5 Test the traction system and apply housekeeping duties.

12. Title: Replace a 3 phase electrical motor between 5,5 kW and 75 kW.

- SO. 1 Describe the requirements pertaining to the replacement, handling and securing of Motors.
- SO. 2 Prepare to replace the motor.
- SO. 3 Replace the motor.
- SO. 4 Prepare and test for operation.

13. Title: Repair an electronic control system for AC traction on a trackless machine.

- SO. 1 Explain the requirements for faultfinding and repairs on an electronic control system for AC traction motors.
- SO. 2 Prepare to repair the electronic control system.
- SO. 3 Test, diagnose and locate the fault.
- SO. 4 Repair the fault.
- SO. 5 Test the traction system and apply housekeeping duties.

14. Title: Repair an electronic controller on a battery-operated machine.

- SO. 1 Explain the requirements pertaining to the repair of an electronic controller
- SO. 2 Prepare to repair the electronic controller
- SO. 3 Repair the electronic controller
- SO. 4 Prepare and test the machine for operation.

15. Title: Restore power by joining a high voltage electrical cable.

- SO. 1 Explain the requirements pertaining to joining high voltage cables.
- SO. 2 Prepare to join the cable.
- SO. 3 Join the cable.
- SO. 4 Prepare and test the cable.

Unit standards Titles at NQF 04**1. Title: Repair a drum type continuous mining machine.**

- SO. 1 Explain the requirements pertaining to fault finding on a continuous miner.
- SO. 2 Prepare to repair a continuous miner.
- SO. 3 Test, diagnose and locate the fault.
- SO. 4 Repair the fault.
- SO. 5 Restore the continuous miner to operational status.

2. Title: Repair a roadheader.

- SO.1 Explain the requirements pertaining to fault finding on a roadheader.
- SO. 2 Prepare to repair a roadheader.
- SO. 3 Test, diagnose and locate the fault.
- SO. 4 Repair the fault.
- SO. 5 Restore the roadheader to operational status.

3. Title: Repair a wall mining shearer.

- SO. 1 Explain the requirements pertaining to fault finding on a wall mining shearer.
- SO. 2 Prepare to repair a wall mining shearer.
- SO. 3 Test, diagnose and locate the fault.
- SO. 4 Repair the fault.
- SO. 5 Restore the wall mining shearer to operational status

General Education and Training Certificate in Basic Technical Practice (Energy) - NQF 1: 143 (minimum 129 credits)				
Category			L	Cr
Fundamental				41
Mathematical Literacy and Numeracy	7462	Demonstrate an understanding of real and imaginary number systems	1	2
	7480	Demonstrate an understanding of real and imaginary number systems	1	1
	7485	Demonstrate an understanding of rational and irrational numbers, and number	1	1
	7448	Work with patterns in various contexts	1	2
	7457	Work with a wide range of patterns and transformations of functions and solve related problems	1	2
	7451	Collect, analyse, use and communicate numerical data	1	2
	7460	Use structured models to describe and analyse shape and motion in 2- and 3-dimensions	1	3
	7453	Use algebraic notation, conventions and terminology to solve problems.	1	3
Communication Studies and Language	7524	Show a critical awareness of language usage	1	3
	7526	Engage with aesthetic, affective, cultural and social values in texts	1	3
	7528	Identify, access, analyse, use and present information	1	4
	7530	Use appropriate communication skills, conventions and structures for specific purposes and situations	1	4
	7534	Explore and use a variety of strategies to learn	1	3
	7535	Engage with meaning, organization and structure of texts	1	3
Forms of energy; Science and Technology; World of Work			1	5
	9839	Apply and maintain safety in an electrical environment		
Core				68
Energy efficiency; Environmental awareness; Managing own work processes, work organisation, resources and quality; Managing personal relationships in a work environment; Occupational health and safety, first aid and fire fighting; Technical components and systems; Hand and power tools and measuring equipment and instruments; Materials and theory				
7495		Demonstrate that a person is a physical, mental, spiritual and social being	1	2
7497		Explain human physical development and sexuality	1	2
7501		Discuss one-to-one family and community relationships and value systems	1	2
7502		Discuss and explain social diversity, human rights and alternative perspectives	1	2
7503		Display a critical understanding of human rights and alternative perspectives	1	2
7496		Practice effective self-management skills	1	2
7504		Demonstrate skills that relate to a safe and secure environment	1	2

7449	Critically analyse how mathematics is used in social, political and economic relations	1	2
7450	Work with measurement in a variety of contexts	1	2
8662	Analyse and communicate workplace data	1	3
7461	Use maps to access and communicate information concerning routes, location and direction.	1	1
7463	Describe and represent objects and the environment in terms of shape, space, time and motion	1	2
10287	Facilitate the use of technology by adult learners In basic skills training	1	1
9881	Mark off basic regular engineering shapes	2	6
8493	Maintain occupational health and safety	2	2
9914	Handle and care for materials	3	12
	Identify, inspect, use, maintain and care for engineering hand tools	1	6
	Install electrical wire ways	1	6
	Maintain electrical distribution boards and panels	1	6
	Select, use and care for power tools	1	5
Electives – minimum credits: 20			34
Distribution; Electrical Construction; Engineering; Generation; Transmission; Renewable Energy; Entrepreneurship; Project Management; Financial Management			
	Maintain and repair a high voltage security fence	2	4
10296	Install an electrical cable	2	3
10253	Restore power by joining a low voltage electrical cable	2	4
10254	Inspect and clean a distribution board.	2	3
10255	Install a distribution board	2	2
10256	Carry out a close inspection and clean a transformer	1	1
10257	Connect a welding plug	2	3
10258	Install a welding socket outlet	2	3
	Carry out a detailed inspection on a flameproof enclosure	2	2
	Terminate and connect a low voltage cable to a source of supply	2	3
	Isolate and restore power to an electrical system	2	2
	Inspect and clean a battery operated tripping unit	2	2
	Repair a lighting system	2	2

National Certificate in Electrical Engineering - NQF 2 131 (minimum 122 credits)				
Category			L	Cr
Fundamental				48
Mathematical Literacy and Numeracy	9882	Read and interpret basic engineering drawings	2	8
	8982	Demonstrate understanding of rational and irrational numbers, and number systems, within the context of relevant calculations	2	3
	8983	Use mathematics to investigate and monitor the financial aspects of personal and community life	2	2
	9009	Apply basic knowledge of statistics in order to investigate life and work related problems	2	3
	9008	Identify, describe, compare, classify, explore shape and motion in 2- and 3-dimensional shapes in different contexts	2	3
Communication Studies and Language	8962	Maintain and adapt oral communication	2	5
	8963	Access and use information from texts	2	5
	8964	Write for a defined context	2	5
	8967	Use Language and Communication in Occupational learning programmes	2	5
Science and Technology; World of Work; Forms of energy	7546	Operate a personal computer system	2	6
	9223	Organise oneself in the workplace	2	3
Core				54
Energy efficiency; Environmental awareness; Managing own work processes, work organisation, resources and quality; Managing personal relationships in a work environment; Occupational health and safety, first aid and fire fighting; Technical components and systems; Hand and power tools and measuring equipment and instruments; Materials and theory				
	Design and construct single phase circuit		2	5
	Install and/or replace an electrical metering / measuring instruments		2	4
	Install low voltage transformers		2	6
	Joint low voltage cables		2	5
	Plan, install and terminate, electrical cables and conductors		2	6
	Select, use and care for electrical measuring instruments		2	4
	Construct, commission and do fault tracing on low voltage reticulation networks		2	6

	Install lighting systems	2	4
10239	Maintain intrinsically safe apparatus	2	2
10240	Install or replace an earth leakage unit in a low voltage circuit	2	3
10241	Carry out a detailed inspection on enhanced safety apparatus	2	3
10242	Replace an electrical cable	2	3
10243	Carry out a detailed inspection on a DC motor	2	3
Electives – minimum credits: 20			29
Distribution; Electrical Construction; Engineering; Generation; Transmission; Renewable Energy; Entrepreneurship; Project Management; Financial Management			
	Maintain and repair a high voltage security fence	2	4
10245	Install a straining wire cable support system	2	2
10246	Switch a high voltage inline switch on and off	2	2
10247	Maintain a cam operated DC motor controller	2	5
10248	Carry out a detailed inspection on an electrical motor	2	3
10249	Replace faulty components in a distribution board	2	3
10250	Install a flitting panel	2	3
10251	Repair a flitting panel	2	4
10252	Disconnect and connect an electric motor	2	3

National Certificate in Electrical Engineering - NQF 3 184 (minimum 173 credits)				
Category			L	Cr
Fundamental				56
Mathematical Literacy and Numeracy	9885	Read and interpret engineering drawings	3	12
	9010	Demonstrate understanding of the use of different number bases and measurement units and an awareness of error in the context of relevant calculations	3	2
	9011	Use mathematics to investigate and monitor the financial aspects of personal and business issues	3	5
	9012	Investigate life and work related problems using data and probabilities	3	5
	9013	Describe, apply and calculate shape and motion in 2- and 3-dimensional space in different contexts	3	4
Communication Studies and Language	8415	Accommodate audience and context needs in oral communication	3	5
	8969	Interpret and use information from texts	3	5
	8970	Write texts for a range of communicative contexts	3	5
	8973	Use language and communication in occupational learning programmes	3	5
Science and Technology; World of Work; Forms of energy	9888	Select, use and care for marking off/out equipment: routine shapes	3	8
Core				97
Energy efficiency; Environmental awareness; Managing own work processes, work organisation, resources and quality; Managing personal relationships in a work environment; Occupational health and safety, first aid and fire fighting; Technical components and systems; Hand and power tools and measuring equipment and instruments; Materials and theory				
9445	Select power transmission systems and accessories		1	1
	Design and construction three phase circuit		3	5
	Design and install electrical wire ways		3	8
	Fault find, repair and maintain industrial electrical circuits		3	8
	Install and commission electrical measuring instruments and control devices		3	5
	Install and commission single phase AC machines and control gear		3	8
	Maintain and repair three phase AC machines		3	8
	Maintain Luminaires		3	6
	Maintain single phase AC machines and motor control gear		3	6
	Repair and maintain power tools		3	6

	Select, install, connect and commission three phase AC machines	3	6
	Wire and commission domestic electrical circuits	3	8
	Wire and commission industrial electrical circuits	3	8
	Commission single phase transformer	3	4
	Fault finding, testing and repair of domestic appliances	3	6
	Maintain lighting systems	3	4
Electives – minimum credits: 20			31
Distribution; Electrical Construction; Engineering; Generation; Transmission; Renewable Energy; Entrepreneurship; Project Management; Financial Management			
	Construct basic electronic circuits	3	4
10271	Isolate and restore power to a high voltage electrical system	3	4
10272	Change tap settings on a three-phase transformer	3	2
10273	Restore power by joining a high voltage electrical cable	3	6
9836	Inspect and clean an electrical enclosure	2	2
10274	Carry out a detailed inspection on high voltage switchgear	3	7
10274	Repair an electronic control system for AC traction on a trackless machine	3	6

National Certificate in Electrical Engineering - NQF 4: 141 (minimum 122 credits)				
Category			L	Cr
Fundamental				50
Mathematical Literacy and Numeracy	7468	Use mathematics to investigate and monitor the financial aspects of personal, business, and national issues	4	6
	9015	Apply knowledge of statistics and probability to critically interrogate and effectively communicate findings on life related problems	4	6
	9016	Measure, estimate and calculate physical quantities and explore, critique and prove geometrical relationships in two and three-dimensional space in the life and workplace of the adult with increasing responsibilities	4	4
Communication Studies and Language	8974	Engage in sustained oral communication and evaluate spoken texts	4	5
	8967	Use language and communication in occupational learning programmes	4	5
	8975	Read analyse and respond to a variety of texts	4	5
	8976	Write for a wide range of contexts,	4	5
	8556	Interact orally and in writing in the workplace	4	14
Core				52
Energy efficiency; Environmental awareness; Managing own work processes, work organisation, resources and quality; Managing personal relationships in a work environment; Occupational health and safety, first aid and fire fighting; Technical components and systems; Hand and power tools and measuring equipment and instruments; Materials and theory				
9015	Apply knowledge of statistics and probability to critically interrogate and effectively communicate findings on life-related problems		4	2
	Diagnose and repair faults on low voltage transformers and equipment		4	6
	Repair three phase AC motor control gear		4	12
	Fault finding on single phase systems		3	5
	Fault finding on three phase systems		4	5
10277	Inspect, test, maintain and commission high voltage transformers		4	10
10279	Identify the correct phase sequence on high voltage transformers and cables		3	3
10280	Replace a 3 phase electrical motor between 5,5 kW and 75 kW		3	3
10281	Connect and commission a 3 phase direct on line motor control system		3	6
Electives – minimum credits: 20				
Distribution; Electrical Construction; Engineering; Generation; Transmission; Renewable Energy; Entrepreneurship; Project Management; Financial Management				39
	Maintain an AC or DC drive unit		4	12

	Audit and specialised repairs on lighting systems	5	5
	Design lighting systems	5	7
	Survey lighting systems	5	7
10285	Change tap settings on a three-phase transformer	3	2
10286	Install an electronic control unit for AC pole changing motors	3	6

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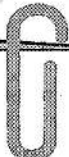
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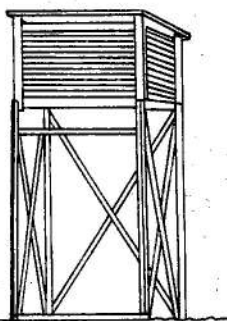
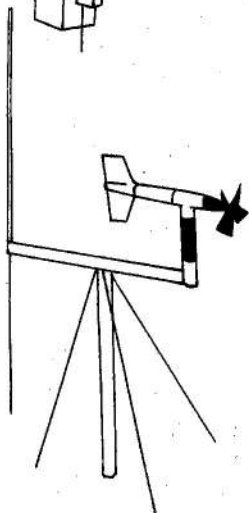
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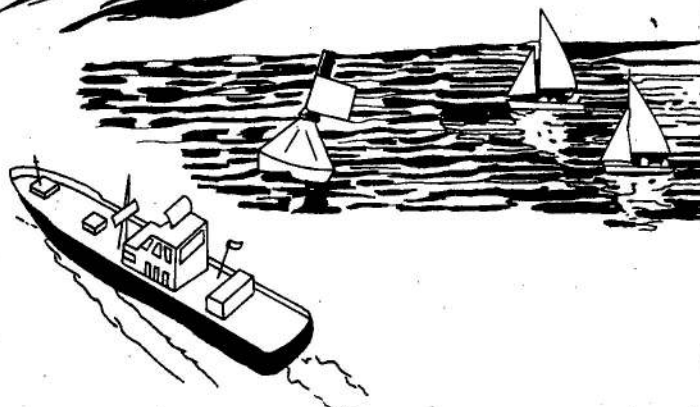
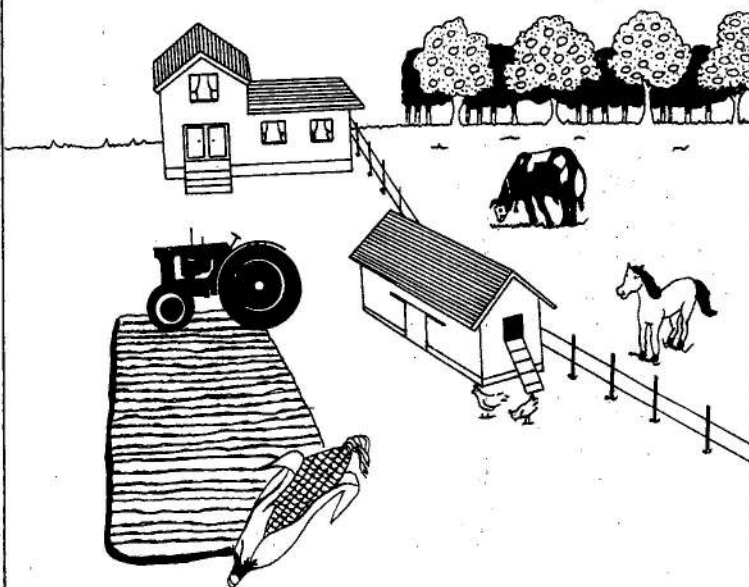
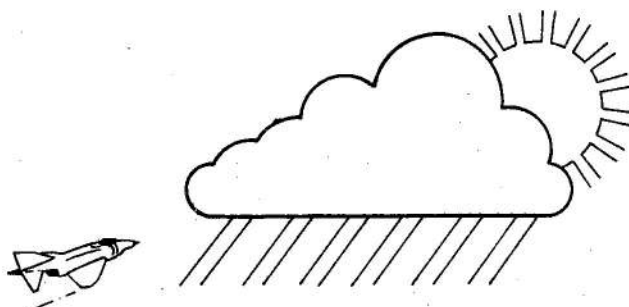
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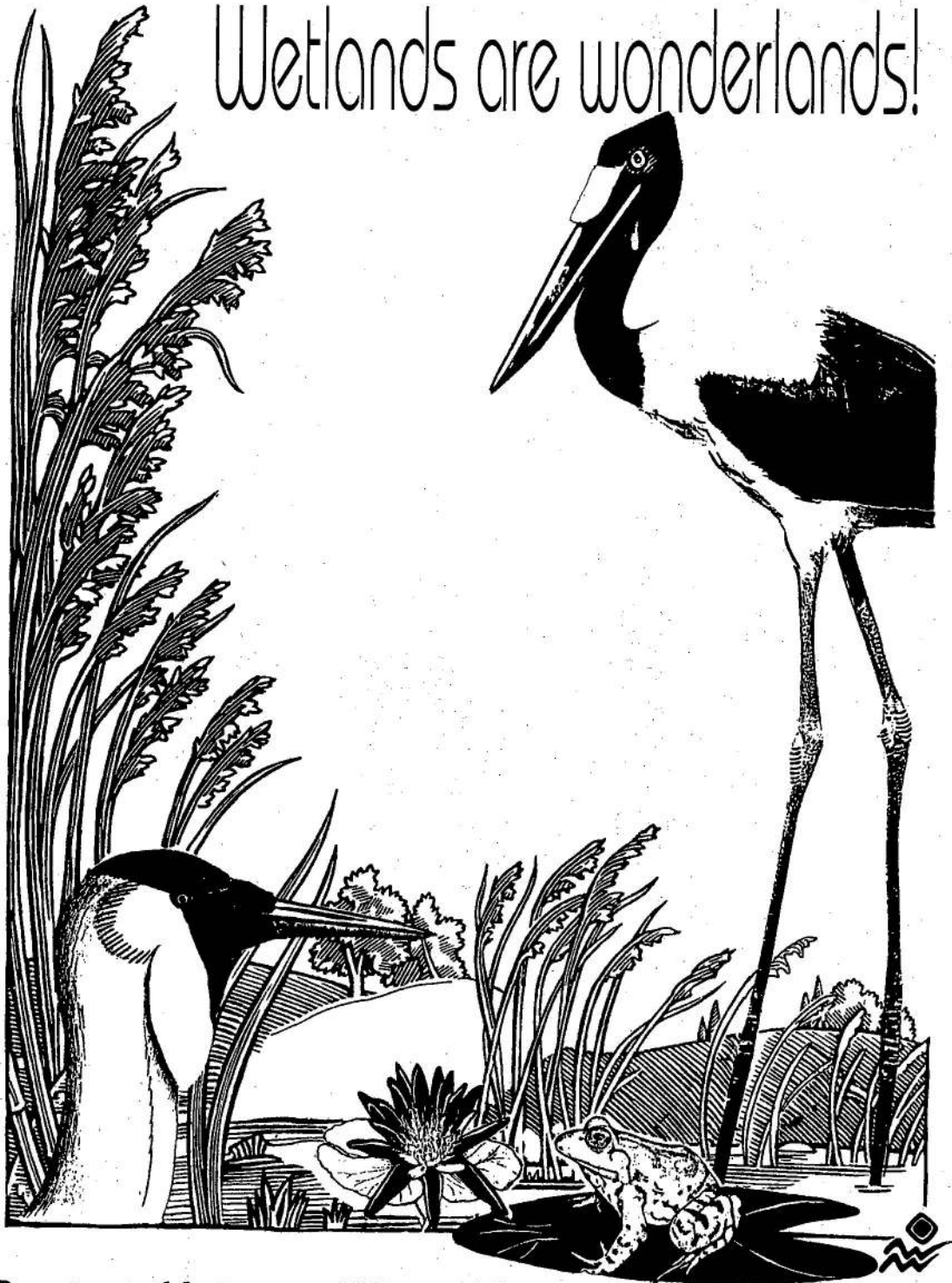
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