basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

Curriculum and Assessment Policy Statement: Occupational Subjects

Grade 8& 9

ELECTRICAL TECHNOLOGY

CONTENT

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SECTION 1:

1.1 BACKGROUND

The *National Curriculum Statement Grades R-12 (NCS)* stipulates policy on curriculum and assessment in the schooling sector.

To improve implementation, the National Curriculum Statement was amended, with the amendments coming into effect in January 2012. A single comprehensive Curriculum and Assessment Policy document was developed for each subject to replace Subject statements, Learning Programme Guidelines and Subject Assessment Guidelines in Grades R-12.

1.2 OVERVIEW

(a) The *National Curriculum Statement Grades R-12 (January 2012)* represents a policy statement for learning and teaching in South African schools and comprises the following:

(i) *Curriculum and Assessment Policy Statements for each approved school subject;*

(ii) *The policy document, National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12; and*

(iii) *The policy document, National Protocol for Assessment Grades R-12 (January 2012).*

(b) The *National Curriculum Statement Grades R-12 (January 2012)* replaces the two current national curricula statements, namely the

(i) *Revised National Curriculum Statement Grades R-9, Government Gazette No. 23406 of 31 May 2002, and*

(ii) *National Curriculum Statement Grades 10-12 Government Gazettes, No. 25545 of 6 October 2003 and No. 27594 of 17 May 2005.*

(c) The national curriculum statements contemplated in subparagraphs b(i) and (ii) comprise the following policy documents which will be incrementally repealed by the *National Curriculum Statement Grades R-12 (January 2012)* during the period 2012-2014:

(i) The Learning Area/Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines for Grades R-9 and Grades 10-12;

(ii) The policy document, National Policy on assessment and qualifications for schools in the General Education and Training Band, promulgated in Government Notice No. 124 in Government Gazette No. 29626 of 12 February 2007;

(iii) The policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), promulgated in Government Gazette No.27819 of 20 July 2005;

(iv) The policy document, An addendum to the policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), regarding learners with special needs, published in Government Gazette, No.29466 of 11 December 2006, is incorporated in the policy document, National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12; and

(v) The policy document, An addendum to the policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), regarding the National Protocol for Assessment (Grades R-12), promulgated in Government Notice No.1267 in Government Gazette No. 29467 of 11 December 2006.

(d) The policy document, *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12*, and the sections on the Curriculum and Assessment Policy as contemplated in Chapters 2, 3 and 4 of this document constitute the norms and standards of the *National Curriculum Statement Grades R-12.* It will therefore, in terms of *section 6A* of the *South African Schools Act, 1996 (Act No. 84 of 1996,)* form the basis for the Minister of Basic Education to determine minimum outcomes and standards, as well as the processes and procedures for the assessment of learner achievement to be applicable to public and independent schools.

1.3 GENERAL AIMS OF THE SOUTH AFRICAN CURRICULUM

(a) The *National Curriculum Statement Grades R-12* gives expression to the knowledge, skills and values worth learning in South African schools. This curriculum aims to ensure that children acquire and apply knowledge and skills in ways that are meaningful to their own lives. In this regard, the curriculum promotes knowledge in local contexts, while being sensitive to global imperatives.

(b) The National Curriculum Statement Grades R-12 serves the purposes of:

- equipping learners, irrespective of their socio-economic background, race, gender, physical ability or intellectual ability, with the knowledge, skills and values necessary for self-fulfilment, and meaningful participation in society as citizens of a free country;
- providing access to higher education;
- facilitating the transition of learners from education institutions to the workplace; and
- providing employers with a sufficient profile of a learner's competences.

(c) The National Curriculum Statement Grades R-12 is based on the following principles:

- Social transformation: ensuring that the educational imbalances of the past are redressed, and that equal educational opportunities are provided for all sections of the population;

- Active and critical learning: encouraging an active and critical approach to learning, rather than rote and uncritical learning of given truths;
- High knowledge and high skills: the minimum standards of knowledge and skills to be achieved at each grade are specified and set high, achievable standards in all subjects;

- Progression: content and context of each grade shows progression from simple to complex;

- Human rights, inclusivity, environmental and social justice: infusing the principles and practices of social and environmental justice and human rights as defined in the Constitution of the Republic of South Africa. The National Curriculum Statement Grades R-12 is sensitive to issues of diversity such as poverty, inequality, race, gender, language, age, disability and other factors;

- Valuing indigenous knowledge systems: acknowledging the rich history and heritage of this country as important contributors to nurturing the values contained in the Constitution; and

- Credibility, quality and efficiency: providing an education that is comparable in quality, breadth and depth to those of other countries.

(d) The National Curriculum Statement Grades R-12 aims to produce learners that are able to:

- identify and solve problems and make decisions using critical and creative thinking;
- work effectively as individuals and with others as members of a team;
- organise and manage themselves and their activities responsibly and effectively;
- collect, analyse, organise and critically evaluate information;
- communicate effectively using visual, symbolic and/or language skills in various modes;
- use science and technology effectively and critically showing responsibility towards the environment and the health of others; and
- demonstrate an understanding of the world as a set of related systems by recognising that problem solving contexts do not exist in isolation.

(e) Inclusivity should become a central part of the organisation, planning and teaching at each school. This can only happen` if all teachers have a sound understanding of how to recognise and address barriers to learning, and how to plan for diversity.

The key to managing inclusivity is ensuring that barriers are identified and addressed by all the relevant support structures within the school community, including teachers, District-Based Support Teams, Institutional-Level Support Teams, parents and Special Schools as Resource Centres. To address barriers in the classroom, teachers should use various curriculum differentiation strategies such as those included in the Department of Basic Education's *Guidelines for Inclusive Teaching and Learning* (2010).

1.4 TIME ALLOCATION

1.4.1 Foundation Phase

(a) The instructional time in the Foundation Phase is as follows:

SUBJECT	GRADE R (HOURS)	GRDES 1-2 (HOURS)	GRADE 3 (HOURS)
Home Language	10	8/7	8/7
First Additional Language		2/3	3/4
Mathematics	7	7	7
Life Skills • Beginning Knowledge • Creative Arts • Physical Education • Personal and Social Well-being	**6** (1) (2) (2) (1)	**6** (1) (2) (2) (1)	**7** (2) (2) (2) (1)
TOTAL	**23**	**23**	**25**

(b) Instructional time for Grades R, 1 and 2 is 23 hours and for Grade 3 is 25 hours.

(c) Ten hours are allocated for languages in Grades R-2 and 11 hours in Grade 3. A maximum of 8 hours and a minimum of 7 hours are allocated for Home Language and a minimum of 2 hours and a maximum of 3 hours for Additional Language in Grades 1-2. In Grade 3 a maximum of 8 hours and a minimum of 7 hours are allocated for Home Language and a minimum of 3 hours and a maximum of 4 hours for First Additional Language.

(d) In Life Skills Beginning Knowledge is allocated 1 hour in Grades R – 2 and 2 hours as indicated by the hours in brackets for Grade 3

1.4.2 Intermediate Phase

(a) The instructional time in the Intermediate Phase is as follows:

SUBJECT	HOURS
Home Language	6
First Additional Language	5
Mathematics	6
Natural Sciences and Technology	3,5
Social Sciences	3

Life Skills • Creative Arts • Physical Education • Personal and Social Well-being	4 (1,5) (1) (1,5)
TOTAL	27,5

1.4.3 Senior Phase

(a) The instructional time in the Senior Phase is as follows:

SUBJECT	HOURS
Home Language	5
First Additional Language	4
Mathematics	4,5
Natural Sciences	3
Social Sciences	3
Technology	2
Economic Management Sciences	2
Life Orientation	2
Creative Arts	2
A maximum of two subjects can be selected from the list of thirteen Elective Occupational subjects to replace any two of the following: Technology, Creative Arts and/or Economic and Management Sciences. The instructional time for these subjects is 2 hours each.	

TOTAL	27,5

Elective Occupational Subjects (Not more than 2)	
1. Agricultural Studies	**Time Allocation per week: 2 hours each**
2. Art and Design	
3. Digital Technology	
4. Early Childhood Development	
5. Mechanical Technology	
6. Electrical Technology	
7. Civil Technology	
8. Hairdressing, Nail and Beauty Technology	
9. Ancillary Health Care Studies	
10. Services: Maintenance and Upholstery	
11. Consumer Studies	
12. Hospitality Studies	
13. Wholesale and Retail Studies	

Grades 10-12

(a) The instructional time in Grades 10-12 is as follows:

SUBJECT	**Time allocation per week (hours)**
Home Language	4,5
First Additional Language	4,5
Mathematics	4,5
Life Orientation	2

A minimum of any three subjects selected from **Group B** Annexure B, Tables B1-B8 of the policy document, *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12,* subject to the provisos stipulated in paragraph 28 of the said policy document.	12 (3x4h)
	27,5

The allocated time per week may be utilised only for the minimum required NCS subjects as specified above, and may not be used for any additional subjects added to the list of minimum subjects. Should a learner wish to offer additional subjects, additional time must be allocated for the offering of these subjects.

SECTION 2:

INTRODUCTION TO ELECTRICAL TECHNOLOGY

2.1 What is Electrical Technology?

Electrical Technology focuses on the understanding and application of Electrical and Electronic principles. The subject focuses on the three main areas namely; Electrical; Electronics and Digits. Graphics Communication and entrepreneurship skills are also infused in the subject

2.2 Specific Aims

Electrical Technology aim to equip the learner with a firm foundation in Electrical Electronics and Digital principles. It provides a foundation of quality, standardised general education which will suit the needs of the learners and help prepare them for life after school and enable them to access particular employment or occupational workplace-based learning. Further studies may also enable the learners to access a vocational qualification at a Technical and Vocational Education Training College in conjunction with an internship at the local industry. Learners will also be able to

Through integrated completion of theoretical work, Practical Assessment Task(PAT) and simulations, the following skills are developed

2.3 Requirements for Electrical Technology as a subject.

Schools wishing to offer Electrical Technology to learners should consider the following requirements that should be met in order to successfully implement the subject.

2.3.1 Time Allocation

The total number of hours allocated for the subject in a five-day cycle is 2 hours. Sufficient time must be allocated in the school timetable for the practical work required to be done. The work has to be planned and stipulated: 1 hour 30 minutes is allocated for practical work and 30 minutes for theoretical work

2.3.2 Resources

The offering of Electrical Technology also requires human resources, Infrastructure, equipment and Machinery.

2.3.2.1 Human resources

Electrical Technology requires a trained subject specialist. i.e. the teacher offering Electrical Technology should be a qualified technical / artisan / technician in a Digital / Electrical and Electronics related area. Industry related experience, and workshop management skills and a tertiary qualification in technical teaching are needed.

Electrical teachers are required to**:**

Teach the subject content with confidence and flair

Interact with learners in a relaxed but firm manner

Manage the workshop resourcing, budget and safety

Manage the teaching environment

Conduct a stock taking inventory

Plan for theory lessons

Plan for practical work

Conduct weekly practical sessions

Maintain and service the workshop

Maintain and service tools and instruments

Ensure learner safety and no learner is permitted to work on the live installation without supervision

Produce models of practical tasks(Projects)

Implement innovative methods to keep the subject interesting

Be self-motivated and keep himself/herself abreast of the latest technological developments

A workshop Assistant

A workshop assistant for Electrical Technology workshop is required to service the workshop. The purpose of this assistant is to perform preventative, maintenance, upgrading service and repair of devices in cooperation with the teacher. An assistant in the Electrical Technology workshop must a sound background of any of the Three Electrical technology subjects.

2.4 Equipped workshop

- Electrical cannot be implemented in a school without a well-equipped workshop.
- The workshop must have an Electricity supply of 230V
- Tools and equipment should have sufficient storage and a well-developed storage management system with update inventory. Shelves should be clearly marked and storage area defined
- The workshop must have a lockable mains distribution board and fitted with an emergency cut-off switch/es which is/are easily accessible at all times. The Red mushroom type emergency switch should preferably be lockable to prevent accidental reconnection with the mains in the case of it being activated.
- Lighting and ventilation is of extreme importance and a workshop should ideally have multiple exits with doors that open outward.
- Tools and equipment and materials should have sufficient storage and well developed storage management system with an up to date inventory.
- Shelves and display boards for tools should be clearly marked and storage areas defined.
- Good housekeeping principles require that all workshops be cleaned regularly. A suitable waste removal system should be in place to accommodate refuse, rubble materials as well as waste. The requirements of the Occupational Health and Safety (OHS) Act 85 of 1993 need to be complied with at all times.
- Subject related posters and designated area where learner practical /projects models canbe exhibited should be clearly visible.

2.5 Sustainable Support

Sustainable support is required for proper implementation of the subject. Regular workshop resourcing is required for the purpose of completion of practical work as well as maintenance. The SMT of a school should have in place a plan to regularly repair or phase out and replace obsolete equipment and tools.

- Workshop resourcing could be subdivided into the following categories:
- Safety equipment
- Tools and equipment
- Consumable materials
- Practical Task resources
- Teaching, learning and support material(LTSM)
- Maintenance

2.6 **Career opportunities**.

Career and occupational opportunities for learners with a foundation in Electrical Technology include but is not limited to:

- Assistant electrician
- Assistant electrical service technician
- Assistant Wiremen
- Auto Electrician
- Installation Electrician
- Radio Technician
- Software Engineer
- Appliance repairmen
- Installer technician

- Electrical service technician
- Robotics Engineer
- Electrical/Electronic Technician

SECTION 3:

OVERVIEW OF TOPICS PER TERM AND ANNUAL TEACHING PLANS

Listed below are topics per grade with a short explanation on the focus. There is content progression on topics covered in grade 8-9.

3.1 Content Outline

Electrical Technology	
Grade 8	Grade 9
Occupational Health and Safety Workshop rules and procedures	Occupational Health and Safety
Graphic Communication	Graphic Communication
Tools and Measuring Instruments The use, care of tools and measuring instruments	Tools and Measuring Instruments
Entrepreneurship	Entrepreneurship
Materials Conductors and Insulators	Materials Conductors and Cables
Basic Principles of Electricity Introduction of electricity	Basic Principles of Electricity
Principles of Magnetism	Principles of Magnetism
Electrical and Electronic Components	Electrical and Electronic Components
Power Sources	Power Sources
Domestic installations	Domestic installations
Logics Basic principles of logic gates	Logics

3.2 CONTENT OUTLINE PER TERM

Grade 8

Term 1

WEEK	TOPIC	CONTENT
4hrs	**Health and Safety**	Workshop orientation Workshop rules and procedures ➢ Workshop Safety ➢ Definition of Accident ➢ Causes of Accidents ➢ Unsafe Acts ➢ Unsafe Conditions ➢ Good housekeeping Personal safety equipment ➢ Eye and ear protection ➢ Head protection ➢ Footwear ➢ Protective clothing Safety signs ➢ Information signs ➢ prohibitions Emergency Evacuation Procedure Basic First Aid ➢ What is HIV/AID and infectious Disease? ➢ How are diseases transmitted ➢ Basic First Aid – incident management ➢ Define first aid What is a first aid kit and what does it entail?

		Types of injuries ➢ Cuts ➢ Burns ➢ Fractures ➢ Trauma (Shock) **Practical** ➢ Demonstrate application of basic first aid. ➢ Stop bleeding ➢ Perform and Emergency Evacuation drill (exercise)
5hrs	**Graphics Communication**	Introduction of Graphics communication ➢ What is graphic Communication ➢ The purpose of Graphics Communication ➢ General drawing principles ➢ Safety precautions when using drawing instruments ➢ Correct use and care of drawing instruments ➢ Free hand sketches ➢ Types of lines ➢ Lines (SANS110 guidelines) ➢ dimensions, lettering and border ➢ Freehand drawing ➢ Scale drawing 1:1 and 1:2 ➢ Pictorial Drawings
5hrs	**Tools and instruments**	**Identification of parts and functions including care and safe use of:** Identify, use and care of the tools and measuring instruments. **Hand tools** ➢ Screw drivers ➢ Phillips/Star ➢ Flat nose ➢ Pliers ➢ Wire stripper **Cutting tools** ➢ Combination pliers

		➢ Side cutter ➢ Longnose plier ➢ Flat nose plier ➢ Round nose pliers ➢ Hacksaw ➢ Files ➢ Chisel **Stripping tools** ➢ Wire Stripper ➢ Utility knife **Measuring tools** ➢ Steel ruler ➢ Measuring Tape ➢ Engineering square ➢ Marking tools ➢ Scriber ➢ Centre punch Electrical and Electronics Software **Practical demonstration of the following:** ➢ Different types of tools ➢ Use a multimeter to test and trace the conducting rows of a breadboard **Practical** 1.Choose one to three tools from the following types of tools to practice on how they are used: ➢ Hand tools ➢ Marking tools ➢ Measuring tools ➢ Cutting tools ➢ Stripping tools 2.Use a multimeter to test and trace the conducting rows of a breadboard
2hrs	**Entrepreneurship**	What is entrepreneurship ➢ Who is an entrepreneur ➢ Types of entrepreneurship ➢ Marketing and branding products ➢ Advertising on media platform

	Revision Term 1 Assignment	Assignment = 50 Marks :40 % Practical =50 Marks:60% Time: 1 hour Assignment to cover all work done in term 1

Term 2

WEEK	TOPIC	CONTENT
2hrs	**Materials**	**What is Conductor?** Examples of conductors ➢ Copper ➢ Aluminium ➢ Gold, ➢ Silver **Properties of conductors** ➢ Copper ➢ Aluminium ➢ Steel ➢ Sea water **What is an Insulator?** Examples of Insulators ➢ Rubber ➢ Glass ➢ Oil ➢ Wood ➢ paper ➢ Porcelain ➢ Diamond ➢ Mica Practical task Sort materials conductors and insulators
10 hrs	**Basic Principles of Electricity**	**Name of component, wiring symbol and function** **Wiring symbols** ➢ Resistor: Variable resistor and LDR ➢ Cell and Battery ➢ Fuse ➢ Earth/ground ➢ Light bulb ➢ Bell and Buzzer ➢ Switches: push button, STST and STDT two-way switch ➢ Capacitor ➢ Diode: LED ➢ Meters: Volt, Ohm and Amp ➢ AND Gate

		➢ Wire ➢ Wires joined ➢ Wires not joined M**ultimeter** ➢ What is a Multimeter **Quantity, SI units and Symbol for the following:** ➢ Voltage ➢ Current ➢ Resistance ➢ Energy ➢ Power **Atomic theory**: ➢ Phases of Matter ➢ Basic Atomic structure ➢ Electron current flow **The three effects of Current** ➢ Magnetic effect ➢ Chemical effect ➢ Heating effect **The Basic electric circuit** ➢ Basic components and their functions ➢ Load: Light bulb, buzzer ➢ Controlling device: Switch ➢ Conductor ➢ **Introduction to Ohms Law** ➢ Ohm's Law – Triangle / Formula ➢ Simple Ohms law calculations ➢ (R=V/I, I=V/R, V=I x R) **Electrical Units/ Quantity Symbols** ➢ Kilo x10^{3} ➢ Mega x10^{6} ➢ Tera x10^{12} ➢ Giga x10^{9} ➢ Milli x10^{-3} ➢ Micro x10^{-6} ➢ Nano x10^{-9} ➢ Pico x10^{-12} Practical 1.Demonstrate how to use a multimeter as the following (the teacher calibrates and set up the multimeter)

		2.Construct a basic circuit consisting of the following: ➢ light bulb ➢ Battery ➢ conductors ➢ SPST and interchange with push button ➢ Multimeter Use a multimeter to measure the Voltage across the load and the current through the circuit 3.Construct a circuit consisting of the following: ➢ buzzer ➢ Battery ➢ SPST and interchange with push button ➢ Multimeter **Practical:** **Demonstration** The use of a Mustimeter as a voltmeter, Ammeter and Ohmmeter Safe use and care of measuring instruments Multimeter (Teacher to set up the instrument) These skills will be practiced in this week and honed throughout the year Use of multimeter as: ➢ Voltmeter ➢ Ammeter ➢ Ohmmeter Practical **Investigating the difference between Pd and Emf (difference)** Construct a circuit consisting of the light bulb, switch, battery and measure the following: 1.Reading on the voltmeter when the switch is off 2.Reading on the voltmeter when the switch is on

4 hrs	**Principle of magnetism**	**Introduction into magnetism** ➢ Magnetic and non-magnetic material ➢ Types of magnets ➢ permanent ➢ temporary magnets ➢ Laws of magnetism ➢ Application of electromagnets Practical 1.using a bar magnet and different materials eg paper, glass and nail and iron filings 2.Using two bar magnets to show the effect of attraction and repulsion 3.Using iron filing to show the presence and pattern of magnetic fields lines around a bar magnet
	Revision and examination	Exam= 80 marks= 40% Practical=50 marks =60% Examination to cover all work done in term 1and term2 Time: 1 hour 30 minutes

Term 3

WEEK	TOPIC	CONTENT The learner is able to:
4hrs	**Electrical Circuits and Electronic components.**	**Identify symbols and Components** ➢ Test components and measure components with a multimeter ➢ Identify the value of the components ➢ Series circuits consisting of two resistors ➢ What are electronic components? ➢ Purpose of electronic components ➢ Types of Components
6 hrs	Power Sources	➢ What is energy ➢ Classification of energy ➢ Kinetic energy ➢ Potential energy ➢ Sources of energy: ➢ Renewable (examples) ➢ Wind energy ➢ Solar energy ➢ Hydro/Water energy ➢ Biomass energy ➢ Geothermal energy ➢ Non-Renewable (examples) ➢ Nuclear energy ➢ Coal energy ➢ Fossil fuel energy ➢ Storing energy ➢ Primary vs Secondary cells: ➢ Difference ➢ Advantages and disadvantages Practical: Make a lemon battery or vegetable chemical cell.
6hrs	Logics	What is Digital What is Analogue The difference between Digital and Analogue Symbol, Circuit diagram and Truth table of the AND Gate **Practical:**

		Build an AND Gate circuit using two switches and a light bulb Teacher demonstrates the AND Gate function by using the 7408 integrated circuit (IC)
	Revision	
	Assessment	Test = 50 Marks :40 % Practical =50 Marks:60% Time: 1 hour Test to cover all work done in term 3
		Activity 1: (Practical project) 150/3=50 Marks = 60% of term mark The owner of a home has developed a system of allowing guests into his home. The guest will press the door bell (switch) and then the owner will press the release door switch on the inside of the home. When the release door switch is pressed then a lamp will be On to indicate that the door has been opened and that the guest should come in. This is the only time that guests will be allowed into the home. Build a simple circuit using 2 X SPST switches, a lamp and a battery to show a practical example of the above. **Activity 2:** - Formal written assessment **50 Marks** – 40%

Term 4

WEEK	TOPIC	CONTENT
16 hrs	**Domestic Installation**	Electrical Energy Distribution from the Supplier to the Consumer Sequence of Connection from Supplier to Consumer: Block Diagram Components used in a Domestic installation: ➢ Earth leakage ➢ Circuit breakers ➢ Isolator ➢ Socket outlet ➢ Switches ➢ Cables ➢ Cable installation: ➢ Gland Purpose of the Gland Types of glands ➢ Connection boxes (domestic) cables ➢ Surface mounting (on trays) ➢ Underground cables ➢ Overhead cables ➢ Cable sizes ➢ Wiring conductors, sizes and uses The 3-pin plug pins identification. **Practical:** ➢ Connect the cable to a 3 pin plug ➢ Join a 3-core cable to a gland
	Revision	Revision of all terms works
	November Examination	Examination=120 marks=40% Practical =marks=60%

Grade 9 Term 1

WEEK	TOPIC	CONTENT
4hrs	**Health and Safety**	General Safety rules ➢ Unsafe Acts ➢ Unsafe Conditions Use personal protective equipment (PPE) Good housekeeping Workshop layout Demarcated areas, emergency stops, exits and first aid stations Safety signs Fire prevention and protection ➢ Elements of fire ➢ Classification of fires ➢ Causes of fires Types of firefighting equipment Basic First Aid – response and incident management Practical Skill – ➢ First aid for fractured arm ➢ First aid for shock
4hrs	**Graphics Communication**	Revision of grade 8 work Freehand Drawings Geometrical drawings Isometric and Orthographic drawings
5hrs	**Tools and instruments**	**Revision of tools covered in Grade 8** **Identify parts and functions including care and correct and safe use of the following:**

		➢ Installation tools ➢ Bending spring ➢ Fish tape ➢ Reamer ➢ Hickey ➢ Stock and dies ➢ Soldering tools ➢ Soldering iron ➢ Solder sucker Practical Soldering and de-soldering techniques
2hrs	**Entrepreneurship**	What is entrepreneurship ➢ Who is an entrepreneur ➢ Types of entrepreneurship ➢ Marketing and branding products ➢ Advertising on media platform ➢ Sourcing of funds ➢ Costing ➢ Business plan
	Revision and Assessment	Assignment = 50 Marks :40 % Practical =50 Marks:60% Time: 1 hour Assignment to cover all work done in term 1

Grade 9 Term 2

WEEK	TOPIC	CONTENT
2hrs	**Material , Conductors and Cables**	Introduction to basic principles of conductors and cables Conductors and Cables ➢ Define a conductor ➢ Define a cable ➢ Types of cables. (House hold)) ➢ Twin flex ➢ Suffix (two core and earth) ➢ Cab tire ➢ GP Wire ➢ Panel wire Installation of cables ➢ Underground cables ➢ Overhead /Open air cables ➢ Trunking cables, (ducts wall mounted) ➢ Advantages and disadvantages ➢ Underground cables ➢ Overhead cables ➢ Trunking cables Solid core and multi stranded cable Advantages and Disadvantages solid core and multi-strand cable
10hrs	**Basic Principle of Electricity**	Basic principles of Electricity and Electrical Measuring Instruments Atomic theory: Simple Ohms law calculations, including Power Definition of the following: ➢ Electron current flow ➢ Conventional current flow ➢ Resistors in series ➢ Resistors in parallel ➢ Resistor calculations (maximum 2 resistors): ➢ Resistors connected in series ➢ Resistors connected in parallel

		Practical Build simple circuits and measure using Multimeter ➢ Building simple circuits to prove Ohms Law ➢ Measure the total resistance of resistors connected in: ➢ Series ➢ Parallel
4hrs	**Principles of magnetism**	➢ Magnetic field around a current carrying conductor ➢ Right hand rule/screw Rule. ➢ Right hand grip rule ➢ Ways of strengthening the magnetic field/flux **Practical** Build an electromagnet Practical Application of an Electromagnet
	Revision and Assessment Practical =50 marks =60% Mid-year Examination =80 marks = 40%	

Grade 9 Term 3

WEEK	TOPIC	CONTENT
4hrs	**Electrical Circuits and Components**	**Identify the Components, symbols, units and functions of the following:** ➢ Capacitor ➢ Diode ➢ LED Diode and LED in the forward bias mode Diode and LED reverse bias mode ➢ Thermistor ➢ Resistor ➢ Incandescent Light ➢ Fuse ➢ Coil ➢ Variable resistor Capacitor ➢ LDR **Practical** • Test the components and measure with a multimeter. • Identify/test/measure different components • Build a series circuit consisting of two resistors • Build a parallel circuit consisting of two resistors **Build a simple circuit containing the following components** the diode and LED in forward and reverse bias mode **Test the components and measure with a multimeter.** **Identify the value of the component.** **Build a simple circuit containing the components** Diode and LED Forward bias Reverse bias
6 hrs	**Power Sources**	**Energy** ➢ The different types of energy sources ➢ Primary/secondary cells as alternative topic Demonstrate an understanding of the following: Basic battery charger:

		• Identify the components of a basic battery charger • Dismantle and assemble a basic battery charger **Regulated power supply:** • Identify the circuit of a regulated power supply • Identify the components of a regulated power supply • Dismantle and assemble a regulated power supply Practical: • Build a lemon battery and measure the voltage • Connect cells in series and measure the voltage
6hrs	**Logic gates**	Logic gates Symbols and truth table of two input gates Revision of the AND gate. OR gate and simple cases where it is used Electric circuit equivalents **Practical** Simulation of AND gate and OR gate using two switches and lights and the drawing of Truth tables Demonstration (by the teacher) Using Integrated circuit of an OR Gate
	Revision and Assessment	Term 3 Test = 50marks =40% Practical formal Assessment =50 Marks , 60%

Grade 9 Term 4

WEEK	TOPIC	CONTENT
16 hrs	**Domestic installation**	Electrical Energy Distribution- Supplier to the consumer Sequence of connections from supplier to consumer- Block diagram SANS 10142-1 Installation regulations The Distribution board What is the Distribution Board PVC CONDUIT AND FITTINGS (identify different fittings and their application) Wiring of the distribution board Distribution board wiring principles WIRING OF SUB-CIRCUITS (Teacher will do the pipe work (tubing) and learners will only draw wires.) Lighting circuit Plug circuit Testing in the sub-circuits (After installation) Lighting circuit Plug circuit 1.Continuity test 2.Insullation resistance between conductors 3.Earth continuity

		PRACTICAL 1 Wire a lighting circuit with a switch PRACTICAL 2 Wire two plugs into a sub-circuit
	Revision and Examination Promotion mark	Examination=120 marks=40% Practical 50marks=60%

SECTION 4

4.1 INTRODUCTION

Assessment is a continuous, planned process of identifying, gathering and interpreting information about the performance of learners, using various forms of assessment. It involves four steps: generating and collecting evidence of achievement; evaluating this evidence; recording the findings and using this information to understand and thereby assist the learner's development in order to improve the process of learning and teaching.

Assessment should be both informal (Assessment for Learning) and formal (Assessment of Learning). In both cases regular feedback should be provided to learners to enhance the learning experience.

Assessment in Electrical Technology measures skills proficiency and knowledge in a range of learning required to work. This capability requires an understanding of the concepts and terminology as well interpretation of circuit diagrams.

4.2 INFORMAL OR DAILY ASSESSMENT

Assessment for learning has the purpose of continuously collecting information about learner performance, that can be used to improve their learning.

Informal assessment is a daily monitoring of learners' progress. This is done through observations, discussions, practical demonstrations, learner-teacher conferences, informal classroom interactions, etc. Informal assessment may be as simple as stopping during the lesson to observe learners or to discuss with learners how learning is progressing. Informal assessment should be used to provide feedback to learners and to inform planning for teaching, but need not be recorded. It should not be seen as separate from the learning activities taking place in the classroom.

Self-assessment and peer assessment actively allow learners to assess themselves. This is important as it allows learners to learn from, and reflect on their own performance. The results of the informal daily assessment tasks are not formally recorded unless the teacher wishes to do so. The results of daily assessment tasks are not taken into account for promotion purposes.

4.3 FORMAL ASSESSMENT

All assessment tasks that make up a formal programme of assessment for the year are regarded as Formal Assessment. Formal assessment tasks are marked and formally recorded by the teacher for progression and certification purposes. All Formal Assessment tasks are subject to moderation for the purpose of quality assurance and to ensure that appropriate standards are maintained.

Formal assessment provides teachers with a systematic way of evaluating how well learners are progressing in a grade and in a particular subject. Examples of formal assessments include tests, examinations, practical tasks, projects, oral presentations, demonstrations, performances, etc. Formal assessment tasks form part of a year-long formal Programme of Assessment in each grade and subject.

Formal assessment tasks form part of a year-long formal Programme of Assessment in each grade and subject, are school-based and are weighted as follows for the different grades:

<table>
<tr><th>Grades</th><th>Formal

School Based Assessments</th><th>End-of-year Examinations</th></tr>
<tr><td>R -3</td><td>100%</td><td>-</td></tr>
<tr><td>4 - 6</td><td>75%</td><td>25%</td></tr>
<tr><td>7 – 9: Academic stream</td><td>40%</td><td>External examination 60%</td></tr>
<tr><td>8: Occupational/Vocational stream</td><td rowspan="2">60%</td><td>Internal Examination 40%</td></tr>
<tr><td>9: Occupational/Vocational stream</td><td>External Examination 40%</td></tr>
<tr><td></td><td>25% including a mid-year examination</td><td></td></tr>
</table>

10 and 11		External examination: 75%
12	25% including mid-year and trial examinations	External examination: 75%

The cognitive demands in assessment should be appropriate for the age and developmental level of the learners in the grade. Assessment in Electrical Technology must cater for a range of cognitive levels and abilities of learners. The assessment tasks should be carefully designed to cover the content of the subject as well as the range of skills and the cognitive levels that have been identified in the specific aims. The design of assessments should therefore ensure that a full range of content and skills are assessed within each Grade in the Phase. The specific aims, topics, content and range of skills in the subject should be used to inform the planning and development of assessments.

Formal assessments must cater for a range of cognitive levels and abilities of learners, as shown below:

Cognitive Levels	Percentage of task
Low Order	50%
Medium Order	30%
High Order	20%

4.4 Programme of Assessment in Grades 8 and 9

	Formal School-Based Assessments			Final End-of-Year Assessments
	Term 1	**Term 2**	**Term 3**	**Term 4**
Grade 8	Assignment (theory) 40%	June Examination 40%	Test 40%	Examination 100%
	Practical Task 60%	Practical Task 60%	Practical Task 60%	
Term Report	100%	100%	100%	
End of Year	School Based Assessment (SBA) = 60%			Examination = 40%
Promotion /Progression	SBA + Year End (Internal) Examination = Promotion 60% + 40% = 100%			

Table below compilation of the school-based assessment in grade 8:

Grade 8			
Description	**Time Frame**	**Weighting of Final Mark**	**Mark Allocation**
Assignment	Term 1	4%	50
Practical		8%	50
June Examination	Term 2	8%	80
Practical		8%	50
Test	Term 3	4%	50
Practical		8%	50

Internal Examination	Term 4	60%	120

	Formal School-Based Assessments			Final End-of-Year Assessments
	Term 1	**Term 2**	**Term 3**	**Term 4**
Grade 9	Assignment (theory) 60%	June Examinations 60%	Test 60%	External Examinations 100%
	Practical Task 40%	Practical Task 40%	Practical Task 40%	
Term Report	100%	100%	100%	
End of Year	School Based Assessment (SBA) = 60%			External Examinations = 40%
Promotion /Progression	SBA + External Examinations = Promotion/ Progression 60% + 40% = 100%			

Table below compilation of the school-based assessment in grade 9:

Grade 9			
Description	**Time Frame**	**Weighting of Final Mark**	**Mark Allocation**
Assignment	Term 1	**4%**	**50**
Practical		**8%**	**50**
June Examination	Term 2	**8%**	**80**
Practical		**8%**	**50**

Test	Term 3	4%	50
Practical		8%	50
External Examination	Term 4	60%	120

Assignment

An assignment is a short task of 1 hour and includes activities such as translation activities, analysis and interpretations of data, Research, Case study, Calculations and drawings and justifying of conclusions. It could further include an activity that the learners do that simulates an Electrical activity or action. This could include the building of models, computer simulations, planning documents, data gathered from experiments, etc. That are based on a specific technological activity. It should cover all term1 with a mark allocation of 50 marks. The forms of assessment used should be age and developmental level appropriate. The design of these tasks should cover the content and context of the subject and include a variety of tasks designed to achieve the objectives of the subject.

Test

A test for formal Assessment should not comprise of a series of small tests be made up of several smaller tests. A test should cover term 1 content and should be set for 60 minutes with a mark allocation of 50 marks (Allocate1mark per fact). The test must cater for a range of cognitive levels. The design of the task should cover the content and context

Examination

Each examination must cater for a range of cognitive levels. For Grades 8 and 9, the 1-hour Mid-year(June) examination in Electrical Technology comprises (80 marks) The midyear examination should cover term 1 and term 2 content. For Grades 8 and 9, the 1 hour 30 minutes' final examination in Electrical Technology comprises (120 marks). The final examination should cover all term 1to term 4 content in Grade 8 and 9. The assignment, term3 test and the mid-year examination and final examination question papers are set by the teacher. The question papers must be moderated by the head of department at the school and approved by the district curriculum advisors / facilitator. This is done to ensure that the prescribed weightings are adhered to by the teacher. The end of the year examination for grade 9 question paper will bet externally set.In the Grade 9 examination **only Grade 9 content** will be assessed. However, prior knowledge from Grade8 may be necessary to interpret and answer some of the questions.

4.4.2 Test weighting in Electrical Technology

Term 3 test (50 Marks)

Note: A variation of +/- 3marks is allowed

Topic	Grade 8		Grade 9	
	Percentage	**Marks**	**Percentage**	**Marks**
Section A (Generic)				
Electrical and Electronic Components	24%	12	24%	12
Power Sources	38%	19	38%	19
Logics	7.5%	19	7.5%	19
Total		50		50

4.4.3 Exam weighting in Electrical Technology

June Examination (80 Marks)

Note: A variation of +/- 3marks is allowed

Topic	Grade 8		Grade 9	
	Percentage	**Marks**	**Percentage**	**Marks**
Section A (Generic)				
Safety	12.5%	10		10
Graphics Communication	12.5%	10		10
Entrepreneurship	7.5%	6		6
Measuring Tools	15%	12		12
Materials	7.5%	6		6
Basic Principles of electricity	32.5%	26		26
Basic Principles of Magnetism	12.5%	10		10
Total		80		80

November Examination (120 Marks)

Note: A variation of +/- 3marks is allowed

Topic	Grade 8		Grade 9	
	Percentage	**Marks**	**Percentage**	**Marks**
Safety	5.8%	7		7
Graphics Communication	5.8%	7		7
Entrepreneurship	3.3%	4		4
Tools	8.3%	10		10
Materials	3.3%	4		4
Basic Principles of Electricity	16.6%	20		20
Principles of Magnetism	5.8%	7		7
Electrical and Electronic and components	5.8%	7		7
Power Sources	9.2%	11		11
Logics	9.2%	11		11
Domestic Installations	26.6%	32		32
Total		120		120

4.4.4. Clarification on theory assessment periods

Grade 8:

Term 1 theory assessment (an assignment) should cover term 1content only

Term 2 theory assessment (Mid-year Examinations) *should cover term* 1 and term2content only.

Term 3 theory assessment(Test) should cover term 3 content only

Term 4 theory assessment should cover terms 1,2,3 and 4 (Internal Examination)

Grade 9:

Term 1 theory assessment (an assignment) should cover term 1content only

Term 2 theory assessment (Mid-year Examinations) *should cover term* 1 and term2 content only.

Term 3 theory assessment(Test) should cover term 3 content only

Term 4 theory assessment should cover terms 1,2,3 and 4 (External Examination)

4.5 RECORDING AND REPORTING

Recording is a process in which the teacher documents the level of a learner's performance in a specific assessment task. It indicates learner progress towards the achievement of the knowledge as prescribed in the Curriculum and Assessment Policy Statements. Records of learner performance should provide evidence of the learner's conceptual progression within a grade and her/his readiness to progress or promote to the next grade. Records of learner performance should also be used to verify the progress made by teachers and learners in the teaching and learning process.

Reporting is a process of communicating learner performance to learners, parents, schools, and other stakeholders. Learner performance can be reported in a number of ways. These include report cards, parents' meetings, school visitation days, parent-teacher conferences, phone calls, letters, class or school newsletters, etc. Teachers in all grades report in percentages against the subject. Seven levels of competence have been described for each subject listed for Grades R - 12. The various achievement levels and their corresponding percentage bands are as shown in the Table below.

Codes and Percentages for Recording and Reporting

Rating code	Description of competence	Percentage
7	Outstanding achievement	80 - 100
6	Meritorious achievement	70 - 79
5	Substantial achievement	60 - 69
4	Adequate achievement	50 - 59
3	Moderate achievement	40 - 49
2	Elementary achievement	30 - 39
1	Not achieved	0 - 29

Note: The seven-point scale should have clear descriptors that give detailed information for each level.

Teachers will record actual marks against the task by using a record sheet; and report percentages against the subject on the learners' report cards.

4.6 MODERATION OF ASSESSMENT

Moderation refers to the process that ensures that the assessment tasks are fair, valid and reliable. Moderation should be implemented at school, district, provincial and national levels. Comprehensive and appropriate moderation practices must be in place for the quality assurance of all subject assessments.

Formal assessment (SBA)
Moderation of written tests and examinations will be conducted by the curriculum advisors / facilitator or a peer teacher.
Grade 8and 9 tasks are internally moderated except for the PAT that is externally moderated. The curriculum advisors/ facilitator must moderate a sample of these tasks during school visits to verify the standard of the internal moderation.
Moderation of written tests constitutes a re-mark of the learner's work to ensure assessment by the teacher is correct. Moderation should be done on three tiers: school, district and province.
School-based moderation requires the HOD to check / control the following:
Learner compliance
•(a)Work done by learners complies with the following requirements:

• Classwork, Homework must reflect the textbook page reflecting a textbook page and exercise reference
• Learner scripts are required to show scrutiny and interaction from the teacher in red pen
• All teacher actions / interventions in the script must be dated
• Learners are required to mark all self-assessments in pencil and all corrections to be shown in pencil.

4.9 Practical Assessment Task (PAT)
The Department of Basic Education issues a Practical Assessment Task for Grade 9 every year.
The format of the Grade 9 PAT is duplicated for Grade 8
In all grades each learner must do a Practical Assessment Task for the year
Grades 8 Teachers will set and assess the Practical Assessment Task and it will be moderated externally by the curriculum advisors/ facilitator.

Grade 9: The practical assessment tasks for Grade 9 will be assessed by the teacher and will be externally moderated by the provincial curriculum advisors/ facilitator.
The date for the external moderation will be decided by the province in which the school is situated.
The provincial education departments or schools may not change or use the task of the previous year. Provisioning of the resources for the Practical Assessment Task is the responsibility of the school and schools should ensure that adequate time and funding is allocated for the completion of the Practical Assessment Task. Practical sessions should be scheduled in such a way that learners have enough time to practise skills needed for the completion of the PAT. Weekly practice sessions are necessary for the learner to hone the needed skills.

The ratio of learners per teacher for all practical work is 1 teacher per 15 learners or part thereof. For groups exceeding15, this means that multiple teachers would be required inside the workshop while practical work is being conducted. Alternatively, groups should be split into numbers below 15 to ensure that a ratio of 1:15 is not exceeded at any time. The motivation for smaller groups lies in the differentiation and mentoring of technical skills that require one on one contact between teacher and learner. The safety of learners is paramount and smaller groups would ensure compliance with the OHS Act 87 of 1993.

NB: The completed PAT project will be made up from different phases and tasks.
Although the final PAT product only needs to be completed in the third term, learners should start working on phase 4
from the first term in order to avoid running out of time to complete the PAT.
Although the final PAT product only needs to be completed in the third term, learners should start working from the first term in order to avoid running out of time to complete the PAT.

4.7 General
This document should be read in conjunction with:

4.7.1 *National policy pertaining to the programme and promotion requirements* of the National Curriculum Statement Grades R-12; and

4.7.2 *National Protocol for Assessment* Grades R-12;

4.7.3 *White Paper 6* on Special Needs Education: Building an Inclusive Education and Training System (2001);

4.7.4 *Guidelines for Responding to Diversity in the Classroom through the Curriculum and Assessment Policy Statements (2011);*

4.7.5 *Guidelines to Ensure Quality Education and Support in Special Schools and Special School Resource Centres (2013);*

4.7.6 *Policy on Screening, Identification, Assessment and Support (2014);*

4.7.7 *Guidelines for Full-service/Inclusive Schools (2010); and*

4.7.8 *Standard Operating Procedures for Assessment of Learners who Experience Barriers*