education

Department of Education
REPUBLIC OF SOUTH AFRICA

NATIONAL CURRICULUM STATEMENT GRADES 10-12

SUBJECT:
ELECTRICAL TECHNOLOGY

TEACHER TRAINING MANUAL 2006

CONTENTS

ELECTRICAL TECHNOLOGY
ORIENTATION PROGRAMME
20 – 24 FEBRUARY 2006

DAY ONE

SESSION 1		
TIME	**TOPIC**	**DURATION**
8:30-9:00	Registration	30 min
9:00-9:30	Activity 1.1 : Opening and welcome Introduction	30 min
9:30-10:00	Activity 1.2 : Overview of the week and training Documents provided.	30min
10:00-10:30	Activity 1.3 : Introduction to NCS and NSC-Part 1	30 min
10:30-11:00	TEA	30 min
11:00-12:00	Activity 1.3 : Introduction to NCS and NSC-Part 2	1 hour
12:00-13:00	Activity 1.3 : Introduction to NCS and NSC-Part 3 Requirements for Higher Education studies Breakaway into subject groups.	1 hour
13:00-14:00	LUNCH	1 hour
SESSION 2		
14:00-15:00	Activity 2.1 : Overview of Electrical Technology	1 hour
15:00-15:30	Activity 2 .2: Content gaps.	30 min
15:30-16:00	TEA	30 min
16:00-18:00	Activity 2.2 : Content gaps Continues	2 hours

DAY TWO

SESSION 2		
TIME	**TOPIC**	**DURATION**
8:30-10:30	Activity 2.3 : Content and Competencies	2 hours
10:30-11:00	TEA	30 min
11:00-13:00	Activity 2.4 : Implications	2 hours
13:00-14:00	LUNCH	1 hour
14:00-15:30	Activity 2.5 : Integration	1h30 min
15:30-16:00	TEA	30 min
16:00-16;30	Activity 2.6 : LTSM	30 min
16:30-18:00	Activity 2.7.1 Implications	1h30 min

DAY THREE

SESSION 2 – continues		
TIME	**TOPIC**	**DURATION**
8:30-9:00	Activity 2.7.1 – Implications continues	30 min
9:00-10:30	Activity 2.7.2 : Principles	1 h30 min
10:30-11:00	TEA	30min
11:00-11:30	Activity 2.7.2 Principles Continues	30 min
11:30-13;00	Activity 2.8 Practical Assessment Task	1`h30 min
13:00-14:00	LUNCH	1hour
14:00-15:30	Activity 2.8 : Practical Assessment Task Continues	1h30 min
15:30-16:00	TEA	30min
1600-17:00	Activity 2.9 : Nated 550 and NCS questions	1 hour
17:00-18:00	Activity 2.9 Nated 550 and NCS continues	1 hour

DAY FOUR

SESSION 3		
TIME	**TOPIC**	**DURATION**
8.30-8.45	Introduction and Recap	15 min
8.45-9.15	Activity 3.1 : Introduction to planning cycle	30 min
9:15-10:30	Activity 3.2 : Introduction to Grade 11 Work Schedule	1.25 hour
10.30-11.00	TEA	30 min
11.00-13.00	Activity 3.3 : Critique the Grade 11 Work Schedule –	2 hours
13:00-14:00	LUNCH	1 hour
14:00-15:30	Activity 3.3 : Critique the Grade 11 Work Schedule – Continue	1.5 hour
15:30-16:00	TEA	
16:00-17:00	Activity 3.4 : Report back on Work Schedule	1 hour
17:00-18:00	Activity 3.5 : Development of Lesson Plan	1 hour

DAY FIVE

SESSION 4		
TIME	**TOPIC**	**DURATION**
8:30-8:45	Introduction and Recap	15 min
8:30-8:45	Introduction and Recap	15 min
8:45-9:45	Activity 1 : Introduction to Assessment in the NCS	1 hour
9:45-10:30	Activity 2: Programme of Assessment for Grade 10 and 11	45 min
10:30-11:00	TEA	30 min
11:00-12:30	Activity 3: Development of Grade 11 Annual Assessment Plan	2 hour
12:30-13:00	Plenary -Way Forward -Way Forward -Closure	1 hour
13:00-14:00	LUNCH	1 hour

SESSION 1 –
Introducing the National Curriculum Statement (NCS) and the National Senior Certificate (NSC) (3-4 hours)

ACTIVITY 1: Introduction of training participants

FORM OF ACTIVITY: Introductions

ACTIVITY 2: Overview of the week of training / documents provided

FORM OF ACTIVITY: Presentation

RESOURCES: The 5-day training programme (PowerPoint)
A hard copy of each document referred to-

- National Senior Certificate Policy
- Subject Statement
- Subject Assessment Guidelines
- Learning Programme Guidelines
- National Protocol on Assessment
- Higher Education admission requirements

CONTENT:

- Training programme for the week and house rules
- Documents making up the National Curriculum Statement policy and documents supporting the National Curriculum Statement policy – purpose and status of each

ACTIVITY 3: Introduction to the NCS and NSC

Part 1: 20 Questions

FORM OF ACTIVITY: Test and discussion

RESOURCES: PowerPoint Presentation, Laptop, and Data Projector

CONTENT:

- 20 questions focusing on the NCS and NSC

INSTRUCTIONS:

- Allow the participants to record their responses to each question as individuals
- Discuss the answers with the group as a whole, inviting participants to offer answers before discussing them

Part 2: NCS and NSC

FORM OF ACTIVITY: Presentation and discussion

RESOURCES: PowerPoint Presentation, Laptop, Data Projector, a hard copy of each document referred to in the presentation-

- National Senior Certificate Policy
- Subject Statement
- Subject Assessment Guidelines
- Learning Programme Guidelines
- National Protocol on Assessment

CONTENT:

- Overview of the NCS, including principles and Critical and Developmental Outcomes
- National Senior Certificate: Requirements, structure and details

Part 3: Requirements for Higher Education study

FORM OF ACTIVITY: Open-book and presentation

RESOURCES: PowerPoint Presentation, Laptop, Data Projector, HE admission requirements

CONTENT:

- Requirements for certificate, diploma and degree programmes

INSTRUCTIONS:

Introduction

- While the Higher Education document is not part of NCS policy, it provides teachers with indicators on required learner performance in NCS subjects for entry into Higher Education
- The 3-year NSC programme is the key to Higher Education study and teachers need to be aware of the admission requirements for different programmes offered at Higher Education Institutions

Open-book activity

- Ask participants to study the HE document and identify the requirements for certificate, diploma and degree programmes

Report back and discussion

- Allow one report back
- Present the requirements (see PowerPoint Presentation)
- Discuss the designated list of subjects, noting that learners already have 3 of the designated subjects in their NSC package – two languages and Mathematics or Mathematical Literacy

SESSION 2 – Introducing the Subject Statement (20 hours)

Activity 2.1	Overview of Electrical Technology integration across learning outcomes

FORM OF ACTIVITY: Power Point Presentation

TIME ALLOCATION: 60 minutes

RESOURCES: PowerPoint presentation, Laptop, Data projector Subject Statement, a hardcopy of each policy supporting documents including a document on HIV/AIDS

INTRODUCTION

- Overview of the subject: Definition, purpose and scope of the subject – its origin
- Learning Outcomes for the subject
- Mention of supporting policies relevant to the subject and how they support the implementation of the subject ELECTRICAL TECHNOLOGY (do not engage in them)
- Time allocation and placement of ELECTRICAL TECHNOLOGY in the school timetable. To be discussed in the activity on IMPLICATIONS FOR LEARNING, TEACHING AND ASSESSMENT.

WRAP UP:

Participants will engage in discussions.
Facilitator will give a brief summary on the introduction of the subject statement

Activity 2.2	What content is new (Knowledge gaps: Electrical Technology Grades 10, 11 and 12)

ENGAGEMENT: Participants will identify any knowledge and skills gaps within the subject which they might have and for which they need further training.

TIME ALLOCATION: 150 minutes

RESOURCES: Subject Statement, Learning Programme Guidelines

INSTRUCTIONS:

- Use the Worksheet No.1 in Appendix 2.2 to complete the task
- Refer to the list provided in the Resource Pack Reference No.1 for comparison between ***Nated 550 and NCS***
- The aim of the worksheet is to identify any knowledge and skills gaps within the subject which you might have and for which you need further training.
- Each participant must complete the worksheet and hand it to the facilitator who will make a duplicate copy and return it to you later during the week.

Wrap up: The facilitator engages the participants in the discussion on how and what could be done to close the content gaps.
The participants hand in the completed worksheet to the facilitator.

Activity 2.3	Content and Competencies taught per Learning Outcome and per grade

ENGAGEMENT: Participants will identify and analyse content, context and competencies implied by the Learning Outcomes and Assessment Standards in Electrical Technology**.**

TIME ALLOCATION: 120 minutes

RESOURCES: Worksheet No. 2, Flipchart, Subject Statement and Learning Programme Guidelines for Electrical Technology.

INSTRUCTIONS:

- Use Worksheet No. 2 in Appendix 2.3 to complete the task.
- The content and competencies in one assessment standard are given in the example.
- Participants to work in six groups

- Reproduce the table on the flipchart showing all the assessment standards for each of the Learning Outcomes.
- Identify and analyse the content, context and competencies implied by the Learning Outcomes and Assessment Standards in Electrical Technology for Grades 10, 11 and 12.
- Participants will report back as indicated by the facilitator.
  Allow each presenter approximately 5 minutes to give his/her presentation to the plenary.
- Facilitator allows comments/questions from the other groups.

Wrap up: The facilitator to give brief explanation on how Bloom's taxonomy was used during the curriculum development process. Teachers to note how this technique can be used in setting of question papers

Activity 2.4	**Implications on teaching and learning**
ENGAGEMENT:	Participants will identify and analyse content and context and relate them to Learning Outcomes and Assessment Standards
TIME ALLOCATION:	120 minutes
RESOURCES: Subject Statement, Learning Programme Guidelines, Flipchart and Worksheet No. 3	

INSTRUCTIONS:

- The participants will complete the Worksheet No. 3 according to the content focus areas (main topics) provided.
- The worksheet to be completed requires participants to suggest why, where and how the knowledge/skills will be taught within the new approach to teaching and learning
- Blank spaces should be comprehensively filled.
- Appoint a scribe to write the answers on the flipchart for reporting back

Wrap up: The facilitator will refer the participants to the resource pack to discuss the content focus areas as per content depth provided. (Resource pack)

ACTIVITY 2.5	The Integration of Learning Outcomes and Assessment Standards Within Electrical Technology

ENGAGEMENT: Demonstrate an understanding of the integration of Learning Outcomes and Assessment Standards within Electrical Technology

TIME ALLOCATION: 90 minutes

RESOURCES: Subject Statement, Learning Programme Guidelines and Flipcharts

INSTRUCTIONS:

- Divide into 6 groups
- Appoint a representative to give feedback at the end of the activity
- Use flip charts provided to consolidate your ideas as a group
- Refer to the extract provided for Learning Outcomes and Assessment Standards (Resource Pack, Reference No. 2)
- Identify the number of assessments standards that are relevant in the scenario given below.
- List the number of Learning Outcomes where the assessment standards were taken from.
- Explain in your own words whether integration was evident.

Scenario

Practical integration of Learning Outcomes and Assessment Standards

AT Motswedi village Eskom supplies the community with a transformer which supplies current less than 300 Amps. Mr Nkosi was granted a business license to establish a welding shop which needs a current supply more than 300 Amps. Eskom managed to provide a transformer which supplies 305 amps.

Wrap-up:
Facilitator concludes the activity by explaining the integration of Learning Outcomes and Assessment Standards within Electrical Technology.

Activity 2.6	LEARNER TEACHER SUPPORT MATERIAL REQUIRED TO TEACH ELECTRICAL TECHNOLOGY
ENGAGEMENT:	Discussion in plenary.
TIME ALLOCATION:	30 minutes
RESOURCES:	Guidelines for selecting Learner Teacher Support Material and Power Point presentation
BACKGROUND READING: None	

INSTRUCTIONS: This activity will be presented by the facilitator.

- Participants work in Six Groups
- They have to refer to the Resource Pack, Reference No. 3
- Participants to read and analyse the LTSM selection criteria list

Wrap up:
The facilitator will allow discussions to critique the guiding criteria for selecting LTSM.
The facilitator concludes the activity

ACTIVITY 2.7

Activity 2.7.1	IMPLICATIONS FOR ASSESSMENT
ENGAGEMENT:	Participants will demonstrate an understanding of the new approach to assessment in Electrical Technology
TIME ALLOCATION:	120 minutes
RESOURCES:	Worksheet No. 4, Flip Chart, Koki Pens, Prestik, Subject Statement and Learning Programme Guidelines for Electrical Technology
BACKGROUND READING:	Subject Statement, Learning Programme Guidelines and Assessment Guidelines

Facilitator asks participants to draw a house (no further information should be given).

INSTRUCTIONS

- Each participant must draw a house.
- Allow participants five minutes to draw
- Participants will assess their task themselves.

- Facilitator reads out the marking /assessment criteria to participants to mark their drawing

ASSESSMENT CRITERIA

Is your house green
Are there two bathrooms?
Does your house have a chimney?
Is it a four-roomed house?
Does a house have a garden?
Is there a stoop?

Have you been able to say yes to all the questions?
Why not?

POSSIBLE RESPONSES:

- The instructions were not clear
- No criteria were given
- No specifications were included.
- No clear guidelines were given

Wrap up:

- Participants allocate marks according to the set criteria.
- Facilitator asks participants for scores from those willing to provide them
- Facilitator asks participants how they feel about being assessed without the Assessment criteria given in advance.
- Facilitator emphasizes the importance of planning and designing assessment according to principles.
- In the Subject Assessment Guidelines there are some definite principles that we as teachers need to adhere to when designing assessment activities, whether it is formative or summative purposes. We will now look at those principles.

Activity 2.7.2	**PRINCIPLES OF ASSESSMENT**
ENGAGEMENT:	Participants will demonstrate an understanding of the new approach to assessment in Electrical Technology
TIME ALLOCATION:	120 minutes
RESOURCES:	Flipchart and Worksheet No. 5.
BACKGROUND READING:	Subject Statement, Learning Programme Guidelines and Assessment Guidelines

INSTRUCTIONS:

- Work in six groups
- Select any learning outcome for your subject
- Select an applicable Assessment Standard under the selected Learning Outcome

- Select suitable content and context for demonstrating that selected Assessment Standard.
- Design a suitable assessment task based on the above information.
- The completed assessment task must be on the flipchart
- Do group assessment by using the worksheet given to guide the planning of the task
- Groups' representatives will present to the plenary

WRAP UP: Facilitator summarizes the whole activity on assessment (Resource pack)

Activity 2.8	**PRACTICAL ASSESSMENT TASK**
ENGAGEMENT:	Project designing process
TIME ALLOCATION:	180 minutes
RESOURCES:	Learning Programme Guidelines, Subject Assessment Guidelines and Flipcharts

INSTRUCTIONS:

- Participants divide into 6 groups
- Design two projects: light current and heavy current project
- Design a rubric to assess the project portfolio

OUTLINE OF A PROJECT: Use the following steps to design the project:

- Background of concepts
- Brief on what to design
- Context of the design
- Component requirements for the design
- Specification of the design
- Description of capability task
- Design an assessment tool for project component of the practical task

Wrap up:

- All groups to present their completed project portfolio, rubric for project portfolio and assessment tool for the project
- Facilitator engages the groups in discussion to critique one another(groups)
- Brief discussion on Subject Assessment Guidelines

Activity 2.9	A CRITICAL REVIEW OF THE PAST EXAMINATION QUESTION PAPERS BASED ON REPORT 550 WITH THE VIEW OF CONVERTING THEM TO QUESTIONS SUITABLE FOR ASSESSING LEARNER PEFORMANCE IN A TECHNOLOGY CONTEXT

ENGAGEMENT: Comparing Nated 550 with NCS questions

TIME ALLOCATION: 120 minutes

RESOURCES: Learning Programme Guidelines, Subject Assessment Guidelines, Subject Statements, NATED 550 grade 11 question papers and Worksheet No.6

INSTRUCTIONS

- Participants work in six groups
- The Worksheet No. 6 in Appendix 2.9 contains a list of assessment standards across all grades
- Participants must identify which level of Bloom's taxonomy appears to be addressed by the following extracts of assessment standards.
- Use the verb in the assessment standard to guide you.
- After completing the worksheet against the chosen Assessment Standards select relevant content and design a question based on that assessment standard.

Wrap up:

Representatives from different groups present possible answers from the worksheet
Facilitator allows groups to critique each other.
Facilitator explains briefly how Bloom's taxonomy is applied when setting question papers.
Facilitator summarizes the activity.

SESSION 3 –
Planning for teaching subjects in the NCS (8 hours)

ACTIVITY 1: Introduction to the planning cycle (½ hour)

FORM OF ACTIVITY: Presentation and discussion

RESOURCES: PowerPoint Presentation, Laptop, and Data Projector

CONTENT:
- Three stages of planning
- Purpose, role-players and duration per stage
- Issues to consider when developing a Learning Programme
- Brief overview of the key activities and development process per stage

ACTIVITY 2: Introduction to the Grade 11 Work Schedule (1 hour)

FORM OF ACTIVITY: Presentation and discussion

RESOURCES: OHP of Grade 11 Work Schedule, OHP Projector, OHP Pens, OHP Sheets, Subject Assessment Guidelines, Learning Programme Guidelines, and Subject Statement

CONTENT:
- Elements of design
- Process of design
  - Integration: What, how and why?
  - Sequencing: What, how and why?
  - Pacing: What, how and why?
  - Suggested assessment tasks: What and why? – will return to this in Session 4
  - LTSM: What and why?

ACTIVITY 3: Critique the Grade 11 Work Schedule (4½ hours)

FORM OF ACTIVITY: Interactive, report back and discussion

RESOURCES: Grade 11 Work Schedule, Subject Statement, Learning Programme Guidelines, and Subject Assessment Guidelines

CONTENT:
- Grade 11 Work Schedule

INSTRUCTIONS:

- Participants study the example of the Grade 11 Work Schedule provided in the LPG and critique it:
  - Does the Work Schedule cover all the Assessment Standards (i.e. content)?
  - Integration: Are the Assessment Standards appropriately linked?
  - Are the Assessment Standards covered in sufficient detail and depth?
  - Pacing: Is the time allocation across the 40 weeks appropriate?
  - Sequencing: Is the content presented in the correct order?
  - Are relevant LTSM listed? If not, list the LTSM required.
  - How can the Work Schedule be improved?

ACTIVITY 4: Report back (1 hour)

FORM OF ACTIVITY: Report back and discussion

RESOURCES: Subject Statement, Learning Programme Guidelines

CONTENT:

- Improved Grade 11 Work Schedule

INSTRUCTIONS:

- Allow different groups to present their improved version of the exemplar Work Schedule for Grade 11
- Engage participants in a discussion after each presentation

ACTIVITY 5: Development of the first Lesson Plan for Grade 11 (1 hour)

FORM OF ACTIVITY: Presentation, interactive, report back and discussion

RESOURCES: PowerPoint Presentation, Laptop, Data Projector, Subject Statement, and Learning Programmed Guidelines

CONTENT:

- Grade 11 Lesson Plan
  - Elements of design
  - Process of design

INTRODUCTION:

- Lesson Plan: What it is and its duration
- Pointers on deciding on the number of Lesson Plans to be written
- Elements and design of a Lesson Plan
- Teaching method: What and why
- Assessment strategy: Who, when, how and form of assessment
- Expanded opportunities: Inclusive approach to accommodate all learners

INSTRUCTIONS:

- Provide an overview of the elements and the design process of a Lesson Plan
- Engage participants in the development of the first Lesson Plan that will be presented for the first 2-5 weeks of the school year according to the Grade 11 Work Schedule critiqued in Activity 3
- Allow one group to present and then discuss their presentation

SESSION 4 –
Annual assessment plan (8 hours)

ACTIVITY 1: Introduction to assessment in the NCS (¼ hour)

FORM OF ACTIVITY: Presentation and discussion

RESOURCES: PowerPoint Presentation, Laptop, Data Projector, and National Protocol on Assessment

CONTENT:
- Approach to assessment: Criteria-driven
- Recording process: Record one global mark / code per task and refer to the Subject Assessment Guidelines for guidance on how to arrive at the final mark for the subject
- Reporting process: 7 codes and percentages
- Portfolios: Teacher and learner

ACTIVITY 2: Programme of Assessment for Grades 10 and 11

FORM OF ACTIVITY: Presentation and discussion

RESOURCES: PowerPoint Presentation, Laptop, Data Projector, and Subject Assessment Guidelines

CONTENT:
- Programme of Assessment for Grades 10 and 11 (Section 2 of the Subject Assessment Guidelines): Number of tasks
- Nature of tasks: Forms of assessment suitable to the subject (Section 3 of the Subject Assessment Guidelines) and suitable tools
- Practical Assessment Task (PAT) – if applicable to the subject
- Weighting of tasks for the formal Programme of Assessment and mark allocation

ACTIVITY 3: Development of a Grade 11 annual assessment plan

FORM OF ACTIVITY: Presentation, interactive and discussion

RESOURCES: PowerPoint Presentation, Laptop, Data Projector, and Subject Assessment Guidelines

CONTENT:
- Programme of Assessment for Grade 11: Tasks, topics, tools and dates

INSTRUCTIONS:

- Engage participants in the compilation of a Grade 11 annual assessment plan in which they indicate:
  - Seven tasks: 2 Tests, 2 exams, 2 other tasks and PAT
  - Topics for each task
  - Assessment tools for each task
  - Date and duration of each task
- Ask participants to revisit the Grade 11 Work Schedule (Session 3: Activity 3) and to align the annual assessment plan for Grade 11 with the assessment tasks listed in the Work Schedule

APPENDIX 1: SESSION 1 –– ACTIVITY 3 – PART 1

Make use of your knowledge of the NCS and related documents to answer the following questions.

- *Fill in the answers as quick as possible*
- *Keep answers short and to the point.*

No	Answer
1	
2	
3	
4	
5	
6	
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10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

SESSION 1 – ACTIVITY 3 – PART 3

Study the HE document and identify the requirements for certificate, diploma and degree programmes

HIGHER CERTIFICATE	DIPLOMA	BACHELOR'S DEGREE

Appendix 2.2: Knowledge Gaps

WORKSHEET 1

INSTRUCTIONS:

- Use the work sheet below to complete the task
- Refer to the list in the Resource Pack Reference No.1 for comparison between ***Nated 550 and NCS***
- The aim of the worksheet is to identify any knowledge and skills gaps within the subject which you might have and for which you need further training.
- Each participant must complete the worksheet and hand it to the facilitator who will make a duplicate copy and return it to you later during the week.

WORKSHEET: ELECTRICAL TECHNOLOGY (Appendix 2.2)

Name: _____Province: _____

School:_____Region/District _____

The aim of this check list is to identify any knowledge gaps within the subject specifics which you might have and for which you need further training

Rate yourself for your personal development against the observable behavior in the table (check list) below. Mark the column that represents your current level of competence: The following ratings apply:

- O=Outstanding : significantly above requirements for successful task performance
- E=Excellent : exceeds requirements for successful task performance
- S=Satisfactory :meets requirements for successful task performance
- Marginal= : Below requirements for successful for task performance
- Unsatisfactory :significantly below requirements for successful task
- Performances

CONTENT	O	E	S	M	U
OHS/Personal safety in the work environment					
Hand tools					
Storage of material(good house keeping)					
Safe operation of electrical machines					
Fire equipment					
Locking devices for isolation					
Correct selection and setting of Protective Devices					
Earthing					
First aid kit					
. AC AND DC CIRCUITS					
Explain the principles of ac generation					
Verify electrical laws in both AC and DC circuits					
3.OSCILLOSCOPE AND FUNCTION GENERATOR					
Purpose of an oscilloscope and a function generator					
Using oscilloscopes and function generators in RLC circuits					
4.SINGLE PHASE TRANSFORMERS					
Principles and operation					
Calculations					
5.POWER SUPPLIES					
Operation and application(rectification, filtering and voltage regulation)					
6.SEMICONDUCTORS					
Bi polar transistor: operation, function and characteristic curve					
Thyristor (SCR): function, composition and characteristic curve					
Transistor as a switch: reference to region of operation, Vcc and Vce					
7.AMPLIFIERS					
Operation and construction: common collector, common emitter and common base					
8.PROTECTIVE DEVICES					
Overcurrent and over voltage protection					
Relays, contactors and earthing					
9.SINGLE PHASE MOTORS					
Operation of a single phase induction motor					
Identification and function of components					
Application of motor control circuits					
Testing					
MODULATION AND DEMODULATION					
Explanation of the term modulation and principles of modulation and demodulation with reference to communication systems: FM AND AM					
Medium of carrier					

10.LOGIC CONCEPTS AND CIRCUITS					
Identification and interpretation of logic gates					
Symbols					

Application of logic gates with maximum of three inputs					
Simplification of logic equations using Booleans expression and drawing logic circuits					
Design and construct application circuits with the aid of the truth tables					

Appendix 2.3: Content and Competencies

WORKSHEET 2

INSTRUCTIONS:

- **Use the Worksheet No. 2 below to complete the task.**
- **The content and competencies in one assessment standard are given in the example.**
- Participants to work in six groups
- Reproduce the table on the flip chart showing all the assessment standards for each of the Learning Outcomes.
- Identify and analyse the content, context and competencies implied by the Learning Outcomes
  and Assessment Standards s in Electrical Technology for Grades 10, 11 and 12.
- Participants will report back as indicated by the facilitator.

LO 1: **Technology, Society and the Environment**	**LO 2:** **Technological Process**	**LO 3:** **Knowledge and understanding** (Theoretical)	**LO 4:** **Application of knowledge** (Practical work)
Identify the **key words/noun** in the AS that provides content for the lesson			
Identify the **verb** in the AS which will generate the evidence (competency)			
Example: **AS**: 3 **Content**: Principles of Electricity **Competency**: Gr. 10: Describe Gr. 11: Explain Gr. 12: Determine	AS: Content: Competency: Gr. 10: Gr. 11: Gr. 12:	AS: Content: Competency: Gr. 10: Gr. 11: Gr. 12:	AS: Content: Competency: Gr. 10: Gr. 11: Gr. 12:

Appendix 2.4: Implications on teaching and learning

WORKSHEET 3

INSTRUCTIONS:

- Participants complete the Worksheet below according to the content focus areas (main topics) provided.
- The worksheet to be completed requires participants to suggest why, where and how the knowledge/skills will be taught within the new approach to teaching and learning
- Detailed information to be provided in the relevant spaces.
- Appoint a scribe to write the answers on the flipchart for reporting back

GRADE 11	**ELECTRICAL TECHNOLOGY**		
WHAT: CONTENT/CONCEPTS	**'WHY**	**'WHERE**	**HOW**
PRINCIPLES OF AC GENERATION			
11.1.1/11.1.5VERIFY LAWS IN BOTH AC AND			
DC CIRCUITS			
Introduction of single phase: rotation of loop in a			
magnetic field.			
Difference between direct and alternating current.			
Verify laws in both dc and ac circuits, Kickoff's law.			
11.3.1/11.3.3 RLC CIRCUIT AND OSCILLOSCOPE			
APPLICATION			
Application of OHS ACT where applicable.			
11.4.2/11.4.3. analyse RLC circuits in terms of parallel and series application.			
Calculation of :impedance,			
inductance: current, voltage and resonant frequency			
11.3.7/11.4.8'PRINCIPLES AND OPERATION OF			
TRANSFORMERS			
Purpose of transformers			
Types of transformers: potential and current.			
Single phase transformers calculations including power, apparent and reactive power.			
11.3.1/11.3.8/11.3.10/11.4.1/11.4.6'OPERATION AND APPLICATION OF POWER SUPPLIES AND CONTROLS			
Principles of operation of dc supplies e.g.			
rectification, filtering, and voltage regulation.			
11.3.5/11.4.2/11.2.2 SEMICONDUCTORS			
bipolar transistor: operation, function and			
characteristic curve.			
Thyristor: SCR: function, composition and			
Characteristic curve.			
transistor as switch: reference to region of			
operation and Vcc, Vce.			
11.3.6/11.4.5/11.2.2/11.2.3/11.2.4/11.2.5			
AMPLFIERS			
Definition: a device/circuit that strengthens the signal from the input to an output.			
Operation of transistor amplifier, common collector, common emitter and common base			

Amplification sketches only.			
Characteristics, input and output wave forms.			
Interpretation of load line with an ac signal.			
Active signal region to determine the base and collector current			
application of electronic circuits(Darlington)circuit to investigate current gain.			
11.3.10/11.4.4 PROTECTIVE DEVICES			
Over current and under voltage protection.			
Relays, contactors, earthing.			
11.3.10/11.3.11/11.4.4/11.4.8 SINGLE PHASE CIRCUITS			
AND TESTING OF INSTALATION AND MOTORS			
Operation of single phase induction motor.			
Identify components and functions there of.			
Explain the function of motor control circuits.			
11.1.5/11.3.1/11.3.5/11.3.12/11.4.5 MODULATION AND DEMODULATION			
Mediums			
explanation of the term modulation and principles of modulation			
and demodulation with reference to communication system: FM and AM			
11.3.1/11.3.9/11.4.7 LOGIC CONCEPTS AND CIRCUITS			
Identification and interpretation of logic gates and symbols.			
Application of logic gates with a maximum of three inputs.			
Simplification of logic equations using Boolean expressions and truth table			

Appendix 2.5: Integration of Learning Outcomes and Assessment Standards

INSTRUCTIONS:

- Divide into 6 groups
- Appoint a representative to give feedback at the end of the Appendix
- Use flip charts provided to consolidate your ideas as a group
- Refer to the extract provided for Learning Outcomes and Assessment Standards (Resource Pack, Reference No. 2)
- Identify the number of assessments standards that are relevant in the scenario given below.
- List the number of Learning Outcomes where the assessment standards were taken from.
- Explain in your own words whether integration was evident.

Scenario

At Motswedi village Eskom supplies the community with a transformer which supplies current less than 300 Amps .Mr Nkosi was granted a business license to establish a welding shop which needs a current supply more than 300 Amps. Eskom managed to provide a transformer which supplies 305 amps.

Wrap-up:

Facilitator concludes the activity by explaining the principles of integration.

Appendix 2.6: Learner Teacher Support Material

INSTRUCTIONS: This will be presented by the facilitator.

- Participants work in Six Groups
- Refer to the Resource Pack, Reference No. 3
- Read and analyse the Learner Teacher Support Material selection criteria list

Appendix 2.7.1: Implications for assessment

WORKSHEET 4

INSTRUCTIONS

- Draw a house on this worksheet

Appendix 2.7.2: Principles of assessment

WORKSHEET 5

INSTRUCTIONS:

- Work in six groups
- Select any learning outcome for your subject
- Select an applicable Assessment Standard under the selected Learning Outcome
- Select suitable content and context for demonstrating that selected Assessment Standard.
- Design a suitable assessment task based on the above information.
- The completed assessment task must be on the flipchart
- Do group assessment by using the worksheet given to guide the planning of the task
- Group representatives will present to the plenary

NO	ASPECT TO BE CONSIDERED	YES	NO	COMMENT
1	Is the purpose of assessment clear?			
2	Are the criteria to be used to assess performance indicated?			
3	Does the Appendix allow the learners to engage with the learning outcome(s)?			
4	Does the Appendix provide for different levels of learner performance?			
5	What methods of assessment are used?			
6	Are the methods used appropriate?			
7	Are the learners involved in the assessment?			
8	Are the results to be recorded?			
9	Is the tool for assessing learners' performance designed effectively?			
10	Is it clear how the result is to be used?			
11	Have all the assessment principles been addressed?			

Appendix 2.8: Practical Assessment Task

INSTRUCTIONS:

- Participants divide into 6 groups
- Design two projects: light current and heavy current project
- Design a rubric to assess the project portfolio

OUTLINE OF A PROJECT: Use the following steps to design the project:

- Background of concepts
- Brief on what to design
- Context of the design
- Component requirements for the design
- Specification of the design
- Description of capability task
- Design an assessment tool for project component of the practical task

Appendix 2.9: How to set questions according to NCS requirements

Participants will demonstrate an understanding of how the Learning Outcomes and Assessment Standards facilitate cognitive and conceptual development within and across grades.

INSTRUCTIONS:

- Participants organise themselves into pairs.
- In the table below, Column A contains a list of assessment standards across all grades. Use the **verb** in the assessment standard to guide you.
- Participants must identify which level of Bloom's Taxonomy appears to be addressed by the extracts from the assessment standards
- Bloom classifies learning into the following categories. Use this list to assist you to identify the cognitive level in the table.

1. **Knowledge** – the ability, on request, to remember, recall, or recognise facts or ideas.

2. **Comprehension** – the ability to use knowledge that is remembered more or less as it is originally presented and intended to be used.

3. **Application** – the ability to use general ideas or principles in particular situations.

4. **Analysis** – the ability to separate the elements of an idea or passage and to examine each one individually.

5. **Synthesis** – the ability to combine elements into greater structures or wholes.
6. **Evaluation** – the ability to judge how well ideas and materials satisfy certain criteria.

WORKSHEET 6

	Grade	Assessment Standard (Verbs)	Level on Bloom's Taxonomy
A	10, 11 & 12 Technological Process	**Identify,** **investigate,** **define,** **analyse** problems in a given real life situation	Knowledge Analysis Comprehension
B		**Design** possible solutions for problems	
C		**Make/improve** products according to the selected design	
D		**Evaluate** the product against the initial design	
E		**Present** assignments by means of a variety of communication media	
F	10	**Describe** the principles of magnetism	
G	11	**Explain** the principles of single phase AC generation	
H	12	**Explain** three phase AC generation	
I	10	**Describe** the principles of electricity	
J	11	**Explain** the principles and effect of AC on R,L,C components	
K	12	**DETERMINE the effect of AC on series and parallel R,L,C, components combination circuits**	
L	10	**IDENTIFY and describe the characteristics of electronic components**	
	11	**EXPLAIN the operation principles, characteristic curve an use of semi conductor devices**	

	12	**EXPLAIN the operating principles of switching and control circuits**	
M	10	**DESCRIBE the principles of operation and use of power sources**	
N	11	**Describe** the principles of operation, use of power supplies	
O	12	**NONE**	
P	10	**DESCRIBE basic logic concepts**	
Q	11	**COMBINE logic concepts to form logic systems**	
	12	COMBINE logic concepts as an introduction to programmable control	
R	10	**Describe** and compare different types of protective devices	
S	11	**Explain** the operating principles of different protective devices	
T	12	NONE	
U	10	**DRAW single phase circuits**	
V	11	**Explain** the operating principles and application of single phase motors	
W	12	**Explain** the operating principles and application of three phase motors and control	

Appendix 3.2: Work Schedule

INSTRUCTIONS:

Participants study the example of the Grade 11 Work Schedule provided in the LPG and critique it:

- Does the Work Schedule cover all the Assessment Standards (i.e. content)?
- Integration: Are the Assessment Standards appropriately linked?
- Are the Assessment Standards covered in sufficient detail and depth?
- Pacing: Is the time allocation across the 40 weeks appropriate?
- Sequencing: Is the content presented in the correct order?
- Are relevant LTSM listed? If not, list the LTSM required.
- How can the Work Schedule be improved?

Appendix 3.5: Development of a lesson plan

CONTENT:

- Grade 11 Lesson Plan
  - Elements of design
  - Process of design

INTRODUCTION:

- Lesson Plan: What it is and its duration
- Pointers on deciding on the number of Lesson Plans to be written
- Elements and design of a Lesson Plan
- Teaching method: What and why
- Assessment strategy: Who, when, how and form of assessment
- Expanded opportunities: Inclusive approach to accommodate all learners

INSTRUCTIONS

- Provide an overview of the elements and the design process of a Lesson Plan
- Engage participants in the development of the first Lesson Plan that will be presented for the first 2-5 weeks of the school year according to the Grade 11 Work Schedule critiqued in Activity 3
- Allow one group to present and then discuss their presentation

Exemplar of a lesson plan for electrical technology

LESSON PLAN				
Educator:		School:		
Subject:				
Grade:		Class:		
CO's:				
LO's and AS's				
Educators' activities	**Learners' activities**	**Resources**	**Assessment**	**Time allocation**
		.	.	
……..	……..		……	
Date started	Date completed		Educator's signature	

SESSION 4 - Appendix4.1

SESSION 4 – ACTIVITY 3
ANNUAL ASSESSMENT PLAN FOR GRADE 11

SUBJECT: ELECTRICAL TECHNOLOGY **GRADE: 11** **YEAR:2007**

TERM 1	TERM 2	TERM 3	TERM 4
TASK 1	**TASK 3**	**TASK 5**	**TASK 7**
LO(s) and Topic: Form: Date: Duration: Tool:	LO(s) and Topic: Form: Date: Duration: Tool:	LO(s) and Topic: Form: Date: Duration: Tool:	LO(s) and Topic: Form: Date: Duration: Tool:
TASK 2	**TASK 4**		
LO(s) and Topic: Form: Date: Duration: Tool:	LO(s) and Topic: Form: Date: Duration: Tool:		
TASK 6: Practical Assessment Task			
LO(s) and Topic: Date: Duration: Tool(s):			