PROVINCE OF THE

EASTERN CAPE

EDUCATION

DIRECTORATE:

CURRICULUM FET PROGRAMMES

ELECTRICAL TECHNOLOGY

GRADE 12

LESSON PLANS

TERM 3

FOREWORD

The following Grade 12 Lesson Plans were developed by Subject Advisors during May 2009. Teachers are requested to look at them, modify them where necessary to suit their contexts and resources. It must be remembered that Lesson Plans are working documents, and any comments to improve the lesson plans in this document will be appreciated. Teachers are urged to use this document with the following departmental policy documents: Subject Statement; LPG 2008; SAG 2008; Examination Guidelines 2009 and Provincial CASS Policy / Guidelines.

Lesson planning is the duty of each and every individual teacher but it helps when teachers sometimes plan together as a group. This interaction not only helps teachers to understand how to apply the Learning Outcomes (LOs) and Assessment Standards (ASs) but also builds up the confidence of the teachers in handling the content using new teaching strategies.

It must please be noted that in order to help teachers who teach across grades and subjects, an attempt has been made to **standardise lesson plan templates** and thus the new template might not resemble the templates used in each subject during the NCS training. However, all the essential elements of a lesson plan have been retained. This change has been made to assist teachers and lighten their administrative load.

Please note that these lesson plans are to be used only as a guide to complete the requirements of the Curriculum Statements and the work schedules and teachers are encouraged to develop their own learner activities to supplement and /or substitute some of the activities given here (depending on the school environment, number and type of learners in your class, the resources available to your learners, etc).

Do not forget to build in the tasks for the Programme of Assessment into your Lesson Plans.

Strengthen your efforts by supporting each other in clusters and share ideas. Good Luck with your endeavors to improve Teaching, Learning and Assessment.

SUBJECT: ELECTRICAL TECHNOLOGY **GRADE: 12** **LESSON PLAN 1** **TERM 3** **TIME: 8HRS**

CORE CONTENT: THYRISTOR FAMILY CONTROL

- Operation of thyristor family (Diac and Traic) and application in practical control circuits.
- Construct thyristor control circuits and investigate the input and output.

LEARNING OUTCOME 1: **TECHNOLOGY SOCIETY AND THE ENVIRONMENT**		**LEARNING OUTCOME 2:** **TECHNOLOGICAL PROCESS**		**LEARNING OUTCOME 3:** **KNOWLEDGE AND UNDERSTANDING**		**LEARNING OUTCOME 4:** **APPLICATION OF KNOWLEDGE**	
12.1.1 Predict the impact of future developments in technology on society and environment.		12.2.1 Identify, investigate, define and analyse problems in a given real-life situation.		12.3.1 Apply the Occupational Health and Safety (OHS)Act and regulations where applicable		12.4.1 **Safety and instruments** Identify unsafe conditions and acts and apply tools and instruments correctly.	
12.1.2 Respect human rights and analyse issues relating to employment equity.		12.2.2 Generate and/or design possible solutions for problems.				12.4.2 **Electrical applications** Construct and analyse single-phase and three phase circuits.	
12.1.3 Describe, explain and respond to medical emergencies in context, taking cognisance of health issues such as HIV/Aids.		12.2.3 Make or improve products according to the selected design.		12.3.3 Explain three-phase AC generation.		12.4.3 **Electronics** Construct and analyse electronic circuits	
12.1.4 Analyse how solutions to technological problems in different cultures are combined into an optimum solution		12.2.4 Evaluate the product against the initial design.		12.3.4 Determine the effect of AC on series and parallel resistor, inductor and capacitor component combination circuits.		12.4.4 **Digital electronics** Construct and analyse programmable control circuits.	
12.1.5 Identify and investigate possible entrepreneurial opportunities.		12.2.5 Present assignments by means of a variety of communication media.					
				12.3.6 Explain the operating principles of switching and control circuits.	**X**		
				12.3.7 Analyse the output of amplifiers, taking characteristics and feedback			

				into account.			
				12.3.8 Explain the operation and use of three-phase transformers.			
				12.3.10 Combine logic concepts as an introduction to programmable control.			
				12.3.12 Explain the operating principles and application of three-phase motors and control.			
TEACHER ACTIVITIES		**LEARNER ACTIVITIES**		**RESOURCES**		**ASSESSMENT**	**DATE COMPLETED**
Revise operation of the transistor		Learners will answer worksheet questions		Work sheet		Completed worksheet	
Show different types of thyristor components to learners.(TRAIC,DIAC)		During this period learners will bring these components and discuss in groups		Classroom, Electronic laboratory with Components (DIAC,TRAIC)		Assignments (peer) Task based Experiments Assignments (Observation) Applied Theory (Task based) Drawing of components	
Discuss the symbol , function, operating principles and characteristic curve of the: DIAC TRIAC		Draw circuits containing (TRAIC, DIAC) using symbols and characteristic curve.		Classroom, Electronic laboratory with Components (DIAC,TRAIC) Text book Black board		Assignments (peer) Task based Experiments Assignments (Observation) Applied Theory (Task based) Drawing of components Summary of content (class work)	
Explain and construct the operation of components in speed control and power control of incandescent lamps		Learners will bring drawings and practical examples of circuits using Thyristors.		Classroom, Electronic laboratory with Components (DIAC,TRAIC) Practical circuits Work sheet		Assignments (peer) Task based Experiments Assignments (Observation) Applied Theory (Task based Completed worksheet	
Homework:							
Enrichment/Expanded Opportunities:							
Teacher Reflections:							

SIGNATURES:

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TEACHER DATE HOD / SMT DATE

SUBJECT:ELECTRICAL TECHNOLOGY **GRADE: 12** **LESSON PLAN 2** **TERM 3** **TIME: 20HRS**

CORE CONTENT: DESIGN AND CONSTRUCT THREE PHASE MOTOR CIRCUITS. TESTING OF THREE PHASE EQUIPMENT:

- Operation of three-phase induction motors.
- Function of motor starters and interpretation of schematic diagrams.
- Motor calculations including efficiency.
- Wire various types of control circuits that include timing devices for the control of motors.

LEARNING OUTCOME 1: **TECHNOLOGY SOCIETY AND THE ENVIRONMENT**		**LEARNING OUTCOME 2:** **TECHNOLOGICAL PROCESS**		**LEARNING OUTCOME 3:** **KNOWLEDGE AND UNDERSTANDING**		**LEARNING OUTCOME 4:** **APPLICATION OF KNOWLEDGE**	
12.1.1 Predict the impact of future developments in technology on society and environment.		12.2.1 Identify, investigate, define and analyse problems in a given real-life situation.		12.3.1 Apply the Occupational Health and Safety (OHS)Act and regulations where applicable		12.4.1 **Safety and instruments** Identify unsafe conditions and acts and apply tools and instruments correctly.	**X**
12.1.2 Respect human rights and analyse issues relating to employment equity.		12.2.2 Generate and/or design possible solutions for problems.				12.4.2 **Electrical applications** Construct and analyse single-phase and three phase circuits.	**X**
12.1.3 Describe, explain and respond to medical emergencies in context, taking cognisance of health issues such as HIV/Aids.		12.2.3 Make or improve products according to the selected design.		12.3.3 Explain three-phase AC generation.		12.4.3 **Electronics** Construct and analyse electronic circuits	
12.1.4 Analyse how solutions to technological problems in different cultures are combined into an optimum solution	**X**	12.2.4 Evaluate the product against the initial design.		12.3.4 Determine the effect of AC on series and parallel resistor, inductor and capacitor component combination circuits.		12.4.4 **Digital electronics** Construct and analyse programmable control circuits.	
12.1.5 Identify and investigate possible entrepreneurial opportunities.		12.2.5 Present assignments by means of a variety of communication media.					
				12.3.6 Explain the operating principles of switching and control circuits.			
				12.3.7 Analyse the output of amplifiers,			

				taking characteristics and feedback into account.			
				12.3.8 Explain the operation and use of three-phase transformers.			
				12.3.10 Combine logic concepts as an introduction to programmable control.			
				12.3.12 Explain the operating principles and application of three-phase motors and control.	**X**		
TEACHER ACTIVITIES		**LEARNER ACTIVITIES**		**RESOURCES**		**ASSESSMENT**	**DATE COMPLETED**
Identify unsafe conditions and acts applicable to single phase and three phase motor circuits.		Discuss unsafe conditions and acts applicable to single phase and three phase circuits in groups		Classroom, Electronic laboratory with Components Work sheet		Assignments (peer) Task based. Testing/fault finding Work sheets	
Show and compare single phase and three phase induction motors		Compare advantages and disadvantages of both motors in groups.		Classroom, Electronic laboratory with Components Text book		Assignments (peer) Task based. Testing/fault finding Work sheets	
Explain the use of three phase induction motors		Bring pictures showing the use of induction motors		Classroom, Electronic laboratory with Components Work sheet		Assignments (peer) Task based. Testing/fault finding Practical instructions	
Explain the construction and operation of the three phase induction motor		Use rotational diagram to illustrate how three phase waves are formed.		Classroom, Electronic laboratory with Components Use practical three phase induction motor to demonstrate		Assignments (peer) Task based. Testing/fault finding Photo's	
Discuss protection and control of three- phase systems.		In groups discuss different kind of protection with induction motors.		Classroom, Electronic laboratory with Components Work sheets		Assignments (peer) Task based. Testing/fault finding Work sheets	
Discuss three- phase motor starters (Identify, explain and compare) Direct-on –line Starters/delta starters Autotransformer starter Slip-ring induction motor starter.		Discuss different starters in groups and compare advantages, disadvantages and uses. Learners will also do wiring of starters		Classroom, Electronic laboratory with Components Show learners examples of starters Wiring boards, motors and starters		Assignments (peer) Task based. Testing/fault finding Practical work sheet	
Discuss fault finding and maintenance of motors and switchgear		Learners will to their own list of possible faults in induction motors and discuss them in groups.		Classroom, Electronic laboratory with Components		Assignments (peer) Task based. Testing/fault finding	
Explain Mechanical and Electrical faults		To study circuit diagrams and find fault simulations. Do practical fault finding on induction motors		Classroom, Electronic laboratory with Components Work sheet Faulty induction motors		Assignments (peer) Task based. Testing/fault finding	
Hand out practical task		Hand out practical task		Classroom, Electronic laboratory with Components Work sheets		Assignments (peer) Task based. Testing/fault finding	
Homework							
Enrichment/Expanded Opportunities:							
Teacher Reflections:							

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TEACHER	DATE	HOD / SMT	DATE

SUBJECT:	**ELECTRICAL TECHNOLOGY**	**GRADE: 12**	**LESSON PLAN 3**	**TERM 3**	**TIME: 4HRS**

CORE CONTENT: INSTALLATION, MAINTENANCE AND FAULT FINDING ON THREE-PHASE EQUIPMENT.

- Test, analyse and describe electrical and mechanical faults on three-phase equipment.

LEARNING OUTCOME 1: **TECHNOLOGY SOCIETY AND THE ENVIRONMENT**		**LEARNING OUTCOME 2:** **TECHNOLOGICAL PROCESS**		**LEARNING OUTCOME 3:** **KNOWLEDGE AND UNDERSTANDING**		**LEARNING OUTCOME 4:** **APPLICATION OF KNOWLEDGE**	
12.1.1 Predict the impact of future developments in technology on society and environment.		12.2.1 Identify, investigate, define and analyse problems in a given real-life situation.		12.3.1 Apply the Occupational Health and Safety (OHS)Act and regulations where applicable		12.4.1 **Safety and instruments** Identify unsafe conditions and acts and apply tools and instruments correctly.	**X**
12.1.2 Respect human rights and analyse issues relating to employment equity.		12.2.2 Generate and/or design possible solutions for problems.				12.4.2 **Electrical applications** Construct and analyse single-phase and three phase circuits.	**X**
12.1.3 Describe, explain and respond to medical emergencies in context, taking cognisance of health issues such as HIV/Aids.		12.2.3 Make or improve products according to the selected design.		12.3.3 Explain three-phase AC generation.		12.4.3 **Electronics** Construct and analyse electronic circuits	
12.1.4 Analyse how solutions to technological problems in different cultures are combined into an optimum solution		12.2.4 Evaluate the product against the initial design.		12.3.4 Determine the effect of AC on series and parallel resistor, inductor and capacitor component combination circuits.		12.4.4 **Digital electronics** Construct and analyse programmable control circuits.	
12.1.5 Identify and investigate possible entrepreneurial opportunities.		12.2.5 Present assignments by means of a variety of communication media.					

				12.3.6 Explain the operating principles of switching and control circuits.			
				12.3.7 Analyse the output of amplifiers, taking characteristics and feedback into account.			
				12.3.8 Explain the operation and use of three-phase transformers.			
				12.3.10 Combine logic concepts as an introduction to programmable control.			
				12.3.12 Explain the operating principles and application of three-phase motors and control.			
TEACHER ACTIVITIES		**LEARNER ACTIVITIES**		**RESOURCES**		**ASSESSMENT**	**DATE COMPLETED**
Explain unsafe conditions and acts applicable to three phase equipment. Show how to apply tools and instruments correctly.		Discuss unsafe conditions and acts applicable to three phase equipment in groups. Demonstrate an understanding of using tools and instruments correctly.		Classroom, Electronic laboratory with Components Work sheet		Assignments (peer) Task based. Testing/fault finding Work sheets	
Construct and analyse single phase and three phase circuits.		Demonstrate an understanding of how to construct and apply three-phase circuits such as distribution systems that include star and delta transformer connections or relay logic control circuits.		Classroom, Electronic laboratory with Components Text book		Assignments (peer) Task based. Testing/fault finding Work sheets	
Explain the use of three phase circuits that include timing devices for the control for control of three-phase motors with reference to sequence and star and delta starting		Bring pictures showing the use of induction motors and conducting fault-finding on the motor starters		Classroom, Electronic laboratory with Components Work sheet		Assignments (peer) Task based. Testing/fault finding Practical instructions	
Discuss protection and control of three- phase systems.		In groups discuss different kind of protection with induction motors.		Classroom, Electronic laboratory with Components Work sheets		Assignments (peer) Task based. Testing/fault finding Work sheets	
Discuss three- phase motor starters (Identify, explain and compare) Direct-on –line Stars /delta starters Autotransformer starter Slip-ring induction motor starter.		Discuss different starters in groups and compare advantages, disadvantages and uses. Learners will also do wiring of starters		Classroom, Electronic laboratory with Components Show learners examples of starters Wiring boards, motors and starters		Assignments (peer) Task based. Testing/fault finding Practical work sheet	
Discuss fault finding and maintenance of motors and switchgear		Learners will to their own list of possible faults in induction motors and discuss them in groups.		Classroom, Electronic laboratory with Components		Assignments (peer) Task based. Testing/fault finding	
Explain Mechanical and Electrical faults		To study circuit diagrams and find fault simulations. Do practical fault finding on induction motors		Classroom, Electronic laboratory with Components Work sheet Faulty induction motors		Assignments (peer) Task based. Testing/fault finding	
Hand out practical task		Hand out practical task		Classroom, Electronic laboratory with Components		Assignments (peer) Task based. Testing/fault finding	

		Work sheets		
Homework				
Enrichment/Expanded Opportunities:				
Teacher Reflections:				

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TEACHER	DATE	HOD / SMT	DATE