PROVINCE OF THE

EASTERN CAPE

EDUCATION

DIRECTORATE:

CURRICULUM FET PROGRAMMES

LESSON PLANS

TERM 3

MECHANICAL TECHNOLOGY

GRADE: 11

FOREWORD

The following Grade 11 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 endeavours to improve Teaching, Learning and Assessment.

SUBJECT: Mechanical Technology	GRADE: 11	LESSON PLAN 1	TERM 3	TIME: 8HRS

CORE CONTENT: ENGINEERING MATERIAL

- Heat treatment processes

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	
11.1.1 Discuss and evaluate the interrelationship between technology, society and the environment		11.2.1 Identify, investigate, define and analyse problems in a given real-life situation.		11.3.1 Demonstrate an understanding of the Occupational Health and Safety (OHS) Act and regulations where applicable		11.4.1 Apply all relevant safety measures.	
11.1.2 Consider human rights issues and discuss fair and equal employment practices		11.2.2 Generate and/or design possible solutions for problems		11.3.2 Explain the functions of purpose-made tools and equipment		11.4.2 Demonstrate the care and use of hand and power tools.	
11.1.3 Describe, explain and respond to medical emergencies in context, taking cognisance of health issues such as HIV/Aids.		11.2.3 Make or improve products according to a selected design.		11.3.3 Describe the ways of enhancing the properties of engineering materials by taking environmental aspects like waste management into consideration.	**X**	11.4.3 Apply measures to effect changes to the properties of materials so as to enhance their suitability.	**X**
11.1.4 Compare how different cultures solve technological problems.		11.2.4 Evaluate a product against the initial design		11.3.4 Describe applicable terminology encountered in the subject.		11.4.4 Use intermediate instructions and drawings and apply different cutting methods to make an artefact.	
11.1.5 Discuss the competencies required by entrepreneurs.		11.2.5 Present assignments by means of a variety of communication media.		11.3.5 Explain the uses of permanent joining applications		11.4.5 Use working instructions and apply complex but relevant joining methods.	
				11.3.6 Demonstrate an understanding of the effect of forces, moments and torques on engineering components applying design principles.		11.4.6 Perform intermediate tests to verify various mechanical principles.	
				11.3.7 Analyse the causes of malfunctioning of		11.4.7 Evaluate and report on the deterioration of various mechanical	

				operating systems		components.	
				11.3.8 Analyse the operation of components applicable to mechanical and/or electronic systems and control		11.4.8 Demonstrate competency on intermediate systems and control.	
				11.3.9 Describe the operating principles of pumps.		11.4.9 Demonstrate an understanding of the operating principles of pumps.	
TEACHING ACTIVITIES		**LEARNERS ACTIVITIES**		**RESOURCES**		**ASSESSMENT**	**DATE COMPLETED**
Theory • Describe the properties of various materials including but not limited to: cast iron, spring steel, mild steel, aluminium, lead, copper, tungsten, chrome, white metal and phosphor bronze.etc.		• Take notes, questions and answers. • Group work in discussion on the different properties and ways in enhancing material. Drafting and completing a table in identifying the material according to their properties and uses		Text book Handouts Different materials Testing equipments Workshop		Test Assignment Research Task base Questions and answers	
• Explain and record ways of enhancing properties of material through the following processes: • Tempering Case Hardening Normalising Annealing Hardening		• Take notes, questions and answers. • Group work in discuss different properties and ways in enhancing material. Drafting and completing a table in identifying the material according to their properties and uses		Text book Handouts Different materials Testing equipments Workshop		Test Assignment Research Task base Questions and answers	
Practical: Demonstrate the effect of changes in properties of material due to heat treatment.		Collect and bring different recycle material for demonstration purposes. Observe safety aspects Practical demonstration to determine the effects of the heat treatment, record information for presentation.		**Each group needs:** Text book Worksheets OHS manual Material		Test Assignment Research Task base Questions and answers	
Homework:							
Enrichment/Expanded Opportunities:							
Teacher Reflections:							

SIGNATURES:

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TEACHER DATE HOD / SMT DATE

SUBJECT: Mechanical Technology	GRADE: 11	LESSON PLAN 2	TERM 3	TIME: 8HRS

CORE CONTENT: MAINTENANCE

- **Malfunctions of operating systems**

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	
11.1.1 Discuss and evaluate the interrelationship between technology, society and the environment		11.2.1 Identify, investigate, define and analyse problems in a given real-life situation.		11.3.1 Demonstrate an understanding of the Occupational Health and Safety (OHS) Act and regulations where applicable		11.4.1 Apply all relevant safety measures.	
11.1.2 Consider human rights issues and discuss fair and equal employment practices		11.2.2 Generate and/or design possible solutions for problems		11.3.2 Explain the functions of purpose-made tools and equipment		11.4.2 Demonstrate the care and use of hand and power tools.	
11.1._ Describe, explain and respond to medical emergencies in context, taking cognisance of health issues such as HIV/Aids.		11.2.3 Make or improve products according to a selected design.		11.3.3 Describe the ways of enhancing the properties of engineering materials by taking environmental aspects like waste management into consideration.		11.4.3 Apply measures to effect changes to the properties of materials so as to enhance their suitability.	
11.1.4 Compare how different cultures solve technological problems.		11.2.4 Evaluate a product against the initial design		11.3.4 Describe applicable terminology encountered in the subject.		11.4.4 Use intermediate instructions and drawings and apply different cutting methods to make an artefact.	
11.1.5 Discuss the competencies required by entrepreneurs.		11.2.5 Present assignments by means of a variety of communication media.		11.3.5 Explain the uses of permanent joining applications		11.4.5 Use working instructions and apply complex but relevant joining methods.	
				11.3.6 Demonstrate an understanding of the effect of forces, moments and torques on engineering components applying design principles.		11.4.6 Perform intermediate tests to verify various mechanical principles.	
				11.3.7 Analyse the causes of malfunctioning of	**X**	11.4.7 Evaluate and report on the deterioration of various	**X**

				operating systems		mechanical components.	
				11.3.8 Analyse the operation of components applicable to mechanical and/or electronic systems and control		11.4.8 Demonstrate competency on intermediate systems and control.	
				11.3.9 Describe the operating principles of pumps.		11.4.9 Demonstrate an understanding of the operating principles of pumps.	

TEACHING ACTIVITIES	LEARNERS ACTIVITIES	RESOURCES	ASSESSMENT	DATE COMPLETED
Theory The teacher explains causes of malfunction of operating systems such as: - overheating - ignition and gear timing	Taking notes, Listening Interact with handouts Ask questions	Textbooks, handouts, Chalk board , Posters & Demonstration models	Question and answers Class work and assignment. Test	
Practical The teacher demonstrates: - Fault finding procedures on ignition and valve timing. - Way of identifying worn-out mechanical components	Demonstrate skills of problem solving by investigating and establishing fault on ignition and gear timing They diagnose wear on mechanical operating components,	Workshop: Engine, Tools & Equipment.	Checklist, Observation sheet Checklist, Observation sheet Informal test	
Homework:				
Enrichment/Expanded Opportunities:				
Teacher Reflections:				

SIGNATURES:

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TEACHER	DATE	HOD / SMT	DATE

INVESTIGATION

Visit your local tyre fitment and alignment centre.
Ask the manager if you may observe the wheel balancing and alignment technicians perform their respective functions.
Make rough notes of the process, ask questions and take photographs if you have a camera.
When you get home, write a step by step report on how wheels are balanced and aligned.

SUBJECT: Mechanical Technology	GRADE: 11	LESSON PLAN 3	TERM 3	TIME: 20HRS

CORE CONTENT: SYSTEMS AND CONTROL

- **Operating systems**

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	
11.1.1 Discuss and evaluate the interrelationship between technology, society and the environment		11.2.1 Identify, investigate, define and analyse problems in a given real-life situation.		11.3.1 Demonstrate an understanding of the Occupational Health and Safety (OHS) Act and regulations where applicable		11.4.1 Apply all relevant safety measures.	
11.1.2 Consider human rights issues and discuss fair and equal employment practices		11.2.2 Generate and/or design possible solutions for problems		11.3.2 Explain the functions of purpose-made tools and equipment		11.4.2 Demonstrate the care and use of hand and power tools.	
11.1._ Describe, explain and respond to medical emergencies in context, taking cognisance of health issues such as HIV/Aids.		11.2.3 Make or improve products according to a selected design.		11.3.3 Describe the ways of enhancing the properties of engineering materials by taking environmental aspects like waste management into consideration.		11.4.3 Apply measures to effect changes to the properties of materials so as to enhance their suitability.	
11.1.4 Compare how different cultures solve technological problems.		11.2.4 Evaluate a product against the initial design		11.3.4 Describe applicable terminology encountered in the subject.		11.4.4 Use intermediate instructions and drawings and apply different cutting methods to make an artefact.	
11.1.5 Discuss the competencies required by entrepreneurs.		11.2.5 Present assignments by means of a variety of communication media.		11.3.5 Explain the uses of permanent joining applications		11.4.5 Use working instructions and apply complex but relevant joining methods.	
				11.3.6 Demonstrate an understanding of the effect of forces, moments and torques on engineering €components applying design principles.		11.4.6 Perform intermediate tests to verify various mechanical principles.	
				11.3.7 Analyse the causes of malfunctioning of operating systems		11.4.7 Evaluate and report on the deterioration of various mechanical components.	
				11.3.8 Analyse the operation of components applicable	**X**	11.4.8 Demonstrate competency on intermediate systems and	**X**

				to mechanical and/or electronic systems and control		control.	
				11.3.9 Describe the operating principles of pumps.		11.4.9 Demonstrate an understanding - operating principles of pumps.	
TEACHING ACTIVITIES		**LEARNERS ACTIVITIES**		**RESOURCES**		**ASSESSMENT**	**DATE COMPLETED**
THEORY Introduces and explains - The term systems and control - Mechanical drive displaying different types of gears i.e. spur, bevel, helical etc.		Taking notes, Interact with handouts Listen and observe. Ask questions		Textbooks, handouts, Chalk board Videos Posters Demonstration models		Question and answers Class work and assignment. Test	
- Screw thread terminology - Linkage mechanism and clutch mechanism - Classification and uses of levers		Taking notes, Interact with handouts Listen and observe. Ask questions		Textbooks, handouts, Chalk board Videos Posters Demonstration models		Question and answers Class work and assignment. Test	
- Cam mechanism - Hydraulic and pneumatic systems - Purpose and uses of valves, pressure gauges, pistons as an integral part of a pump		Taking notes, Interact with handouts Listen and observe. Ask questions		Textbooks, handouts, Chalk board Videos Posters Demonstration models		Question and answers Class work and assignment. Test	
- Advantages / disadvantages of different makes of gears - Expose learners to belts, pulleys, area of contact, tensions, coefficient of friction - Uses of pulleys, chains, belts.		Taking notes, Interact with handouts Listen and observe. Ask questions		Textbooks, handouts, Chalk board Videos Posters Demonstration models		Question and answers Class work and assignment. Test	
- Divide class into group - Explain group role, Guide, observe and assess		Taking notes, Interact with handout. Listen and observe. Ask questions		Textbooks, handouts, Chalk board Videos Posters		Question and answers Class work and assignment. Test Experiment	
PRACTICAL Explain the ignition timing, demonstrate the setting of the ignition timing on an engine, and draw the ignition system on the chalk board, identify the main components.		Listen, observe, Participate, & take notes,		Workshop: tools and equipment Demonstration models (engine) Posters Text books		Checklist, Observation sheet Informal test	
Homework:							
Enrichment/Expanded Opportunities:							
Teacher Reflections:							

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TEACHER DATE HOD / SMT DATE

Simulation.

1. Research and design a block and tackle system.
2. Avoid using steel wire
3. The system should be able to lift a body weight of 1kg.
4. Sketch your design and label your sketches
5. Your model should be operational
6. Calculate the mechanical advantage of your design

SUBJECT: Mechanical Technology	GRADE: 11	LESSON PLAN 4	TERM 3	TIME: 12HRS

CORE CONTENT: PUMPS

- **Operating principles of pumps**

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	
11.1.1 Discuss and evaluate the interrelationship between technology, society and the environment		11.2.1 Identify, investigate, define and analyse problems in a given real-life situation.		11.3.1 Demonstrate an understanding of the Occupational Health and Safety (OHS) Act and regulations where applicable		11.4.1 Apply all relevant safety measures.	
11.1.2 Consider human rights issues and discuss fair and equal employment practices		11.2.2 Generate and/or design possible solutions for problems		11.3.2 Explain the functions of purpose-made tools and equipment		11.4.2 Demonstrate the care and use of hand and power tools.	
11.1 Describe, explain and respond to medical emergencies in context, taking cognisance of health issues such as HIV/Aids.		11.2.3 Make or improve products according to a selected design.		11.3.3 Describe the ways of enhancing the properties of engineering materials by taking environmental aspects like waste management into consideration.		11.4.3 Apply measures to effect changes to the properties of materials so as to enhance their suitability.	
11.1.4 Compare how different cultures solve technological problems.		11.2.4 Evaluate a product against the initial design		11.3.4 Describe applicable terminology encountered in the subject.		11.4.4 Use intermediate instructions and drawings and apply different cutting methods to make an artefact.	
11.1.5 Discuss the competencies required by entrepreneurs.		11.2.5 Present assignments by means of a variety of communication media.		11.3.5 Explain the uses of permanent joining applications		11.4.5 Use working instructions and apply complex but relevant joining methods.	
				11.3.6 Demonstrate an understanding of the effect of forces, moments and torques on engineering components applying design principles.		11.4.6 Perform intermediate tests to verify various mechanical principles.	
				11.3.7 Analyse the causes of malfunctioning		11.4.7 Evaluate and report on the	

				of operating systems		deterioration of various mechanical components.	
				11.3.8 Analyse the operation of components applicable to mechanical and/or electronic systems and control		11.4.8 Demonstrate competency on intermediate systems and control.	
				11.3.9 Describe the operating principles of pumps.	X	11.4.9 Demonstrate an understanding of the operating principles of pumps.	X

TEACHING ACTIVITIES	LEARNERS ACTIVITIES	RESOURCES	ASSESSMENT	DATE COMPLETED
Theory The teacher describe operation principle of pumps - Classify pumps - state their uses - Show the differences between a single acting & double acting pumps,	Take notes, ask questions, and interact in discussion, learners interact with material, Identify and distinguish between different types pumps such as single and dual pumps	Textbooks, handouts, Chalk board, catalog and magazines, internet, applied theory task. Demonstration pump models Experiments Videos	Task base Assignment	
- explain water hammer & pump slip - Advantages and disadvantages of pumps	Take notes, ask questions, and interact in discussion, learners interact with material,	Textbooks, handouts, Chalk board, catalog and magazines, internet, applied theory task. Demonstration pump models	Task base Assignment	
Practical Describe and demonstrate the operating principles of pumps while dismantling and reassembling.	Identify different components of pump as they dismantle them. The also assess the wear and judge functionality	Workshop: tools and equipment Different pump models Wall Charts on pumps	Checklist, Observation sheet Informal test Practical task	
Homework:				
Enrichment/Expanded Opportunities:				
Teacher Reflections:				

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TEACHER DATE HOD / SMT DATE

ASSIGNMENT

1. In groups, discuss the differences between a centrifugal water pump and a reciprocating water pump with regard to the working principle of each.

2. In pairs, role - play a conversation between a potential client and a sales person. The salesperson is trying to persuade the client to buy a centrifugal pump rather than a reciprocating water pump for a particular application. Reverse roles, and repeat the role play.

3. On your own, use sales catalogues to research different pump manufacturers. Identify the main parts and functions of centrifugal and reciprocating pumps. Summarize your finding on a single A4 page for your portfolio.