



PROVINCE OF THE
EASTERN CAPE
EDUCATION

DIRECTORATE:
CURRICULUM FET PROGRAMMES
LESSON PLANS
TERM 3
MECHANICAL TECHNOLOGY
GRADE: 12

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 endeavours to improve Teaching, Learning and Assessment.

SUBJECT: Mechanical Technology		GRADE: 12		LESSON PLAN 1		TERM 3		TIME: 16 HRS	
CORE CONTENT: MATERIALS <ul style="list-style-type: none">Properties of materials									
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 Analyse the use and application of the Occupational Health and Safety (OHS) Act and regulations where applicable.		12.4.1 Apply all relevant safety measures.			
12.1.2 Respect human rights issues and analyse issues relating to employment equity.		12.2.2 Generate and/or design possible solutions for problems.		12.3.2 Describe the principles and functions of advanced engineering equipment.		12.4.2 Care for and use appropriate specialized engineering equipment.			
12.1.3 Describe, explain and respond to necessary medical emergencies taking cognisance of health issues such as HIV/Aids.		12.2.3 Make or improve products according to a selected design.		12.3.3 Classify enhanced materials according to their properties, uses and their environmental aspects.	X	12.4.3 Select appropriate materials suitable for their application.	X		
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 Apply correct terminology used in the subject in the proper contexts.		12.4.4 Use advanced instructions and/or drawings and apply different cutting methods to make an artefact.			
12.1.5 Identify and investigate possible entrepreneurial opportunities.		12.2.5 Present assignments by means of a variety of communication media.		12.3.5 Distinguish between the correct and the incorrect application of joining methods.		12.4.5 Use working instructions and apply advanced but relevant joining methods.			
				12.3.6 Demonstrate an understanding of the concepts of stress, strain and modulus of elasticity.		12.4.6 Perform advanced tests to verify various mechanical principles.			
				12.3.7 Identify the most suitable preventative maintenance for operating systems.		12.4.7 Suggest applicable repair methods and adjustments to various systems.			
				12.3.8 Use calculations to solve problems concerning systems and control.		12.4.8 Demonstrate competency on advanced systems and control.			
				12.3.9 Describe the operating principles of		12.4.9 Demonstrate an understanding			

				turbines.		of the operating principles of turbines.	
TEACHING ACTIVITIES		LEARNERS ACTIVITIES		RESOURCES		ASSESSMENT	DATE COMPLETED
THEORY Alloys: Introduction to types of alloys <ul style="list-style-type: none">- Discuss and explain the ferrous and non-ferrous metals.- Explain tests made on alloys to identify the type.- Explain the uses of materials and their properties		Take notes, Ask questions, Classify enhanced materials like alloys and composites according to their properties, their uses and considers environmental aspects Identify uses of materials with enhanced properties. Identify the molecular structure of two or three metals that are commonly used		Relevant textbooks, Wall charts on materials Videos		Question and answers Class work and Investigation	
PRACTICAL: Demonstrate various tests to compare properties of material such as tempering and case hardening tests		Perform tests such as tempering and case hardening They identify the type of materials		Workshop: tools and equipment Different types of materials		Checklist, Observation sheet Informal test Task base	
Homework:							
Enrichment/Expanded Opportunities:							
Teacher Reflections:							

SIGNATURES:

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SUBJECT: Mechanical Technology		GRADE: 12		LESSON PLAN 2		TERM 3		TIME: 20 HRS	
CORE CONTENT: MAINTENANCE <ul style="list-style-type: none">Preventative methods (to reduce friction) for 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			
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 Analyse the use and application of the Occupational Health and Safety (OHS) Act and regulations where applicable.		12.4.1 Apply all relevant safety measures. 12.4.1 Apply all relevant safety measures.			
12.1.2 Respect human rights issues and analyse issues relating to employment equity.		12.2.2 Generate and/or design possible solutions for problems.		12.3.2 Describe the principles and functions of advanced engineering equipment.		12.4.2 Care for and use appropriate specialized engineering equipment.			
12.1. Describe, explain and respond to necessary medical emergencies taking cognisance of health issues such as HIV/Aids.		12.2.3 Make or improve products according to a selected design.		12.3.3 Classify enhanced materials according to their properties, uses and their environmental aspects.		12.4.3 Select appropriate materials suitable for their application.			
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 Apply correct terminology used in the subject in the proper contexts.		12.4.4 Use advanced instructions and/or drawings and apply different cutting methods to make an artefact.			
12.1.5 Identify and investigate possible entrepreneurial opportunities.		12.2.5 Present assignments by means of a variety of communication media		12.3.5 Distinguish between the correct and the incorrect application of joining methods.		12.4.5 Use working instructions and apply advanced but relevant joining methods			
				12.3.6 Demonstrate an understanding of the concepts of stress, strain and modulus of elasticity.		12.4.6 Perform advanced tests to verify various mechanical principles.			
				12.3.7 Identify the most suitable preventative maintenance for operating systems.	X	12.4.7 Suggest applicable repair methods and adjustments to various systems.	X		
				12.3.8 Use calculations to solve problems concerning systems and control.		12.4.8 Demonstrate competency on advanced systems and control.			

				12.3.9 Describe the operating principles of turbines.		12.4.9 Demonstrate an understanding of the operating principles of turbines.	
TEACHING ACTIVITIES		LEARNERS ACTIVITIES		RESOURCES		ASSESSMENT	DATE COMPLETED
THEORY: Teacher explains the most suitable preventative measures used in maintaining operating systems. - Explains the different types and applications of lubricants.		Take notes Interacting in discussion Identify different types of lubricants by thickness viscosity, colour and smell verify where they are used		Text books, Handouts, Work sheets Different types of lubricants Videos		Assignment, investigation works Research	
- Replacement and routine maintenance of machinery (oil and grease), lubrication on bearing, linkages, belt and chain drives so to prevent excessive wear through friction.		Take notes Investigate possible causes of wear on machines by referring to available sources. Use previous question papers and exemplars for practice		Text books, Handouts, Work sheets Different types of lubricants Videos		Assignment, investigation works	
PRACTICAL: - Demonstrate repair methods and adjustments to various systems such as mechanical systems; ignition and gear timing systems		Perform fault finding procedure on mechanical systems that might be emanating from fuel system and on ignition timing system.		Text books, handouts, Carburetor model, Running engine		Practical tests Observation sheets Task based	
Demonstrate fault finding procedures on fuel system and on ignition timing to prevent excessive wear		Apply diagnostic method through fault finding in malfunctioning fuel system and ignition and gear timing system					
Homework:							
Enrichment/Expanded Opportunities:							
Teacher Reflections:							

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SUBJECT: Mechanical Technology		GRADE: 12		LESSON PLAN 3		TERM 3		TIME: 16 HRS	
CORE CONTENT: SYSTEMS AND CONTROL									
• Operating systems (Mechanical, Hydraulics and electrical)									
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 Analyse the use and application of the Occupational Health and Safety (OHS) Act and regulations where applicable.		12.4.1 Apply all relevant safety measures.			
12.1.2 Respect human rights issues and analyse issues relating to employment equity.		12.2.2 Generate and/or design possible solutions for problems.		12.3.2 Describe the principles and functions of advanced engineering equipment.		12.4.2 Care for and use appropriate specialized engineering equipment.			
12.1.3 Describe, explain and respond to necessary medical emergencies taking cognisance of health issues such as HIV/Aids.		12.2.3 Make or improve products according to a selected design.		12.3.3 Classify enhanced materials according to their properties, uses and their environmental aspects.		12.4.3 Select appropriate materials suitable for their application.			
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 Apply correct terminology used in the subject in the proper contexts.		12.4.4 Use advanced instructions and/or drawings and apply different cutting methods to make an artefact.			
12.1.5 Identify and investigate possible entrepreneurial opportunities.		12.2.5 Present assignments by means of a variety of communication media.		12.3.5 Distinguish between the correct and the incorrect application of joining methods.		12.4.5 Use working instructions and apply advanced but relevant joining methods.			
				12.3.6 Demonstrate an understanding of the concepts of stress, strain and modulus of elasticity.		12.4.6 Perform advanced tests to verify various mechanical principles.			
				12.3.7 Identify the most suitable preventative maintenance for operating systems.		12.4.7 Suggest applicable repair methods and adjustments to various systems.			
				12.3.8 Use calculations to solve problems concerning systems and control.	X	12.4.8 Demonstrate competency on advanced systems and control.	X		
				12.3.9 Describe the operating principles of turbines.		12.4.9 Demonstrate an understanding of the operating principles of turbines.			

TEACHING ACTIVITIES	LEARNERS ACTIVITIES	RESOURCES	ASSESSMENT	DATE COMPLETE D
THEORY Mechanical, Hydraulics and pneumatics <ul style="list-style-type: none"> Teacher uses calculations to demonstrate understanding of systems and control Brief revision on functions of belt gear drives. Use approved formulas to demonstrate solutions to belt, gear, screw thread, wheel and axle etc. speeds and torque derived from gear cluster combinations 	Take notes, Ask questions, Discuss as groups in trying to find solutions Use calculations given to them to solve different belt and gear speed and torque problems Use formulae to solve mechanical, hydraulic and pneumatic problems	Textbooks, handouts, Chalk board, Various relevant textbooks Calculators Chalk board, Various relevant textbooks Calculators	Question and answers Class work and Investigation Informal class test	
PRACTICAL <ul style="list-style-type: none"> Demonstrate the effects of gear combination to speeds and torque Demonstrate stress testing techniques Demonstrate different types of belt drives, flat and cross belt drives 	Observe, Take notes, Practice by changing gear trains to experience the effect Changing gears on Lathe for different materials.	Workshop: Demonstration models Different types of belt drives Different types of gears and gear train device. Stress testers	Checklist, Observation sheet Task base	
THEORY Fault finding on ABS brake system: <ul style="list-style-type: none"> Electrical / Electronic control Introduction of ABS brakes compared with conventional brake system. Use model to demonstrate the operation. Discuss the difference between the conventional brakes with ABS Lay out the advantages and disadvantages of ABS in comparison with conventional brake system. Calculation on brake power demonstrating the impact and effect of friction 	Take notes, Ask questions, Discuss as groups in trying to find solutions to problem of understanding the concepts.	Textbooks, handouts, Chalk board, Related textbooks Models Calculators	Question and answers Class work Informal test and Investigation	
PRACTICAL <ul style="list-style-type: none"> Demonstrate dismantling and assembling of conventional brake system to demonstrate its operation. Demonstrate dismantling and assembling of ABS and define its operational procedure 	Observe, Take notes, Dismantle and assemble to demonstrate the understanding of ABS operation Dismantle and assemble ABS and define its operational procedure	Model of ABS Relevant tools and equipment Handouts Video clips	Checklist, Observation sheet Investigation	

THEORY Hydraulics: <ul style="list-style-type: none"> - Demonstrate methods and apply formulas to solve problems on hydraulic machines - Introduction to hydraulics. - Explains effects of pressure difference - Discuss the effects of pressure in different volumes and temperatures 	Take notes, Ask questions, Discuss as groups in trying to find solutions to problem of understanding the concepts. Use calculations based and derived from $P=F/A$	Textbooks, handouts, Chalk board, Nated 550 textbooks Demonstration Models	Question and answers Class work and Investigation	
PRACTICAL <ul style="list-style-type: none"> - Use hydraulic jack to explain the functions of hydraulics. - Allow learners to explore the power of hydraulics when dismantling hydraulic brake shoe system 	Observe, Take notes, Dismantle and assemble to demonstrate the understanding of hydraulic system and its components such as plungers, seals and valves	Demonstration Models : Hydraulic jacks, Hydraulic brakes Torque converters Textbooks, handouts, Chalk board, Posters on hydraulic systems Textbooks	Checklist, Observation sheet Informal test Practical demonstration	
Homework:				
Enrichment/Expanded Opportunities:				
Teacher Reflections:				

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SUBJECT: Mechanical Technology		GRADE: 12		LESSON PLAN 4		TERM 3		TIME: 20 HRS	
CORE CONTENT: TURBINES <ul style="list-style-type: none">Operating principles of turbine									
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 Analyse the use and application of the Occupational Health and Safety (OHS) Act and regulations where applicable.		12.4.1 Apply all relevant safety measures.			
12.1.2 Respect human rights issues and analyse issues relating to employment equity.		12.2.2 Generate and/or design possible solutions for problems.		12.3.2 Describe the principles and functions of advanced engineering equipment.		12.4.2 Care for and use appropriate specialized engineering equipment.			
12.1.3 Describe, explain and respond to necessary medical emergencies taking cognisance of health issues such as HIV/Aids.		12.2.3 Make or improve products according to a selected design.		12.3.3 Classify enhanced materials according to their properties, uses and their environmental aspects.		12.4.3 Select appropriate materials suitable for their application.			
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 Apply correct terminology used in the subject in the proper contexts.		12.4.4 Use advanced instructions and/or drawings and apply different cutting methods to make an artefact.			
12.1.5 Identify and investigate possible entrepreneurial opportunities.		12.2.5 Present assignments by means of a variety of communication media.		12.3.5 Distinguish between the correct and the incorrect application of joining methods.		12.4.5 Use working instructions and apply advanced but relevant joining methods.			
				12.3.6 Demonstrate an understanding of the concepts of stress, strain and modulus of elasticity.		12.4.6 Perform advanced tests to verify various mechanical principles.			
				12.3.7 Identify the most suitable preventative maintenance for operating systems.		12.4.7 Suggest applicable repair methods and adjustments to various systems.			
				12.3.8 Use calculations to solve problems concerning systems and control.		12.4.8 Demonstrate competency on advanced systems and control.			

				12.3.9 Describe the operating principles of turbines.	X	12.4.9 Demonstrate an understanding of the operating principles of turbines.	X
TEACHING ACTIVITIES		LEARNERS ACTIVITIES		RESOURCES		ASSESSMENT	DATE COMPLETED
THEORY: Turbines; Introduction to types of turbine - Describe the operating principles of turbines - Explain the importance of lubrication and the heat dissipating on turbines.		Take notes, Ask questions, Demonstrate an understanding of the functions of main components.		Relevant textbooks, Charts Videos Turbo – charger model		Question and answers Class work and Investigation	
PRACTICAL Demonstrate the dismantling method of turbo-charger showing main components.		Dismantle assess the condition of turbine components and assemble Conduct experiments on venerability turbo - charger		Turbine model Turbo – charger Videos on turbines		Checklist, Observation sheet Task based Experiments Demonstrations	
Homework:							
Enrichment/Expanded Opportunities:							
Teacher Reflections:							

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