

2023/24 ANNUAL TEACHING PLANS: ELECTRICAL TECHNOLOGY: ELECTRONICS: GRADE 12 (TERM 1)

TERM 1	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
CAPS TOPICS	Safety (generic)	RLC	RLC	RLC	RLC	RLC	Semi-conductor devices	Semi-conductor devices	Semi-conductor devices	Semi-conductor devices Term 1 assessment	PAT consolidation and assessment
TOPICS, CONCEPTS, SKILLS AND VALUES	<ul style="list-style-type: none"> - First aid - HIV, Aids awareness - OHS Act - Machine-specific safety measures 	Effect of alternating current on R, L and C components in series and parallel circuits	<ul style="list-style-type: none"> - Inductive reactance $X = 2\pi fL$ - Capacitive reactance 	<ul style="list-style-type: none"> - Impedance - Power - Phase angle - Power factor - Phasor and wave representation - Resonance - Q factor & bandwidth 	Calculations <ul style="list-style-type: none"> - Series and parallel combination circuits containing ONE resistor, ONE capacitor and ONE inductor - Frequency changes - Phasor and wave representation - Resonance - Phasor diagram 	<ul style="list-style-type: none"> - Phasor and wave representation - Resonance - Phasor diagram Demonstration: Show the effect of changing frequency in an RLC circuit forward resonance	The field effect transistor <ul style="list-style-type: none"> - Basic construction, symbols, operation, characteristics - Types of FET (NFET, JFET, MOSFET) - Characteristic curves & typical operating voltages, application as a switch - Application as an amplifier 	Uni-junction and Darlington transistor <ul style="list-style-type: none"> - Basic construction, symbols, functional operation, characteristics - Characteristic curves & typical operating voltages - Application as a switch - Application as saw-tooth generator - Application as an amplifier 	Introducing integrated circuits <ul style="list-style-type: none"> - Integrate circuits – the 741 op-amp - Basic construction, symbols, functional operation - Typical operating voltages - Characteristics of an ideal op-amp & application as an amplifier - Gain: Open loop and closed loop gain - Application as an inverting amplifier - Application as a non-inverting amplifier Calculations <ul style="list-style-type: none"> • Inverting amplifier $V_{out} = V_{in} \left(-\frac{R_f}{R_{in}}\right)$ • Non-inverting amplifier ○ $V_{out} = V_{in} \left(\frac{R_f}{R_{in}} + 1\right)$ • Gain ○ $A_v = \frac{R_f}{R_{in}}$ 	Practical: Build a non-inverting amplifier on a breadboard using a 741 Op-Amp Use a function generator and oscilloscope to show input and output waveforms <ul style="list-style-type: none"> - Integrate circuits – the 555 timer <ul style="list-style-type: none"> ➢ Basic construction, symbols, functional operation ➢ Characteristics curves & typical operating voltages ➢ Application as a timer Practical: Build a clock pulse generator using a 555 timer IC on a breadboard and display the output on an oscilloscope	PAT Simulation Complete <ul style="list-style-type: none"> - PAT design part 1: Circuit diagram - component list - circuit description
REQUISITE PRE-KNOWLEDGE	Introduction of the OHS Act, Electrical Machinery Regulations	The effect of AC on RLC series circuits				Introduction to semiconductor and solid-state devices					
RESOURCES (OTHER THAN TEXTBOOK) TO ENHANCE LEARNING	OHS Act - Safety signs in workshop First aid training manuals	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers	RLC simulation "spook box"	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers FET and Darlington simulations	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers	

TERM 1		WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
ASSESSMENT	INFORMAL ASSESSMENT: REMEDIATION	Classwork, case studies, worksheets, homework, theory and practical, etc.										
	SBA (FORMAL)	PAT simulations 1 completed Safe work practices are types of administrative controls that include procedures for safe and proper work used to reduce the duration, frequency, or intensity of exposure to a hazard. The section on tools and equipment must be infused when doing all PAT simulations.										Assignment

2023/24 ANNUAL TEACHING PLANS: ELECTRICAL TECHNOLOGY: ELECTRONICS: GRADE 12 (TERM 2)

TERM 2	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
CAPS TOPICS	Switching circuits	Switching circuits		Switching circuits	Switching circuits	Switching circuits	Switching circuits	Revision	June exam	June exam	June exam
TOPICS, CONCEPTS, SKILLS AND VALUES	Principle of operation of switching circuits using operational amplifiers and timers <ul style="list-style-type: none"> - Multi-vibrators <ul style="list-style-type: none"> •Bistable multi-vibrator - Circuit diagram and operation - Measurement of input and output waveforms 	Mono-stable multi-vibrator <ul style="list-style-type: none"> - Circuit diagram and operation - Measurement of input and output waveforms Practical: Construct a mono-stable amplifier on a breadboard using a 741 Op-Amp, 555 timer and LEDs Astable multi-vibrator <ul style="list-style-type: none"> - Circuit diagram and operation - Measurement of input and output waveforms 		Practical: Construct an astable amplifier on a breadboard using a 741 Op-Amp, 555 timer and show output using LEDs and the oscilloscope Schmidt Trigger <ul style="list-style-type: none"> - Circuit diagram and operation - Display the input waveform in relation to the output waveform on the oscilloscope 	Practical: Construct a Schmidt Trigger on a breadboard using a 741 Op-Amp Comparator and summing amplifier <ul style="list-style-type: none"> - Circuit diagram and operation - Display the input waveform in relation to the output waveform on the oscilloscope - Calculations, etc 	Practical: Construct a comparator on a breadboard using a 741 Op-Amp Practical: Construct a summing amplifier on a breadboard using a 741 Op-Amp	Differentiator and integrator <ul style="list-style-type: none"> - Circuit diagram and operation - Display the input waveform in relation to the output waveform on the oscilloscope - Influence of time constant on the output waveform 	Revision term 1 & 2 content			
REQUISITE PRE-KNOWLEDGE	Electronic components and how they work										
RESOURCES (OTHER THAN TEXTBOOK) TO ENHANCE LEARNING	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers 741 Op-Amp and 555 IC simulations	Educational videos and IT-related resources Old question papers 741 Op-Amp and 555 IC simulations	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers 741 Op-Amp and 555 IC simulations	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers		
ASSESSMENT	INFORMAL ASSESSMENT: REMEDIATION	Classwork, case studies, worksheets, homework, theory and practical, etc.									
	SBA (FORMAL)	PAT simulations 2 completed Safe work practices are types of administrative controls that include procedures for safe and proper work used to reduce the duration, frequency, or intensity of exposure to a hazard. The section on tools and equipment must be infused when doing all PAT simulations.								Mid-year examination	

2023/24 ANNUAL TEACHING PLANS: ELECTRICAL TECHNOLOGY: ELECTRONICS: GRADE 12 (TERM 3)

TERM 3	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11
CAPS TOPICS	Amplifiers	Amplifiers	Amplifiers	Amplifiers	Amplifiers	Revision	Prep exam PAT mod	Prep exam PAT mod	Prep exam PAT mod	Prep exam PAT mod	Prep exam PAT mod
TOPICS, CONCEPTS, SKILLS AND VALUES	Amplifier theory <ul style="list-style-type: none"> - Determination of a typical load line by means of Ohm's Law (revision) - Basic concept of class A, B and C amplifiers AB - Principles of negative feedback, the decibel and log 	Resistor capacitor coupled amplifier (NPN transistor) <ul style="list-style-type: none"> - Basic operation - Circuit diagram & practical - Input and output curves - Frequency response curve - Gain & loss in decibel calculations 	Transformer coupled amplifier (NPN transistor) <ul style="list-style-type: none"> - Basic operation - Circuit diagram - Input and output curves - Frequency response curve 	Push pull amplifier (NPN, PNP transistor) <ul style="list-style-type: none"> - Basic operation - Circuit diagram & practical - Input and output curves - Frequency response curve - Gain & loss in decibel calculations - Typical biasing 	Radio frequency amplifier <ul style="list-style-type: none"> - Basic operation - Circuit diagram - Input and output curves - Frequency response curve - Typical biasing Practical: Construct a simple RF amplifier	Revision Term 1, 2 & 3 content					
REQUISITE PRE-KNOWLEDGE	Operating principle of the transistor as an amplifier										
RESOURCES (OTHER THAN TEXTBOOK) TO ENHANCE LEARNING	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers					
ASSESSMENT	INFORMAL ASSESSMENT: REMEDIATION										
	SBA (FORMAL)	PAT project Safe work practices are types of administrative controls that include procedures for safe and proper work used to reduce the duration, frequency, or intensity of exposure to a hazard. The section on tools and equipment must be infused when doing all PAT simulations.					Preparatory exam				

2023/24 ANNUAL TEACHING PLANS: ELECTRICAL TECHNOLOGY: ELECTRONICS: GRADE 12 (TERM 4)

TERM 4	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10
CAPS TOPICS	Amplifiers SBA moderation	Amplifiers SBA moderation	Amplifiers SBA moderation	Revision SBA moderation	NCS Exams	NCS Exams	NCS Exams	NCS Exams	NCS Exams	NCS Exams
TOPICS, CONCEPTS, SKILLS AND VALUES	Hartley Oscillator (NPN or FET transistor) <ul style="list-style-type: none"> - Basic operation - Circuit diagram - Output waveform - Tank circuit 	Colpitts Oscillator (NPN or FET transistor) <ul style="list-style-type: none"> - Basic operation - Circuit diagram - Output waveform - Tank circuit 	RC Phase Shift Oscillator (NPN or FET Transistor) <ul style="list-style-type: none"> - Basic operation - Circuit diagram - Output waveform - Tank circuit Practical: Construct an RC phase shift oscillator on a breadboard and show the output wave on an oscilloscope							
REQUISITE PRE-KNOWLEDGE	Operating principle of the transistor as an amplifier									
RESOURCES (OTHER THAN TEXTBOOK) TO ENHANCE LEARNING	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers	Educational videos and IT-related resources Old question papers							
ASSESSMENT	INFORMAL ASSESSMENT: REMEDIATION	Classwork, case studies, worksheets, homework, theory and practical, etc.								
	SBA (FORMAL)	Final examination								