

National Revised ATP: Grade 10– Term 1 Grade 10 Electrical Technology: Electronics 2021

TERM 1 (45 days)	1: 27-29 Jan (3)	2: 01-05 Feb (5)	3: 08-12 Feb (5)	4: 15-19 Feb (5)	5: 22-26 Feb (5)	6: 1-5 March (5)	7: 8- 12 March Feb (5)	8: 15-19 Mar (5)	9: 23-26 Mar (4)	10: 29-31 March (3)
CAPS topic	Occupational Health and Safety	Occupational Health and Safety	Basic Principles of Electricity	Basic Principles of Electricity	Basic Principles of Electricity	Basic Principles of Electricity	Basic Principles of Electricity	Basic Principles of Electricity	PAT Consolidation	Revision
Concepts, skills and values	<p>Responsibilities</p> <ul style="list-style-type: none"> - What are your rights in the workshop? - What are your responsibilities in the workshop? <p>General Workshop Rules</p> <ul style="list-style-type: none"> --Housekeeping (Health hazards, safety hazards, workshop layout, workshop management) <p>Workshop Safety</p> <ul style="list-style-type: none"> - Unsafe acts - Unsafe conditions - Walkways (Colour codes), store areas, other designated areas - Information and safety signs - Signs in the workshop - Information signs - Safety signs - Prohibition signs - Fire Safety signs - Regulatory signs <p>Note: Clean the workshop on a weekly basis</p> <p>Emergency Procedures</p> <ul style="list-style-type: none"> - Placement of the Master Switch - Critical versus non-critical emergencies - Medical emergencies - Electrical shock / Electrocution procedures - Evacuation procedures - Principles of fire fighting <p>Practical: Perform an evacuation</p>	<p>Basic First Aid</p> <ul style="list-style-type: none"> - What is HIV/AIDS and infectious disease? - How are diseases transferred? - What to do when someone is bleeding - What to do when someone has been burnt - What to do in case of electrical shock - How to administer CPR <p>Practical: Perform a first aid exercise (Choose a topic from basic first aid).</p> <p>Chemical Safety (Printed Circuit Board Manufacturing)</p> <ul style="list-style-type: none"> - Personal protection equipment - Handling chemicals (Mixing of chemicals, disposing of chemicals, corrosive chemicals) - Where to work with chemicals (Ventilation, lighting, designated area) - Chemical processes in making PCBs (Preparing PCBs, developing the circuitry, etching the board, protecting the board) Environmental considerations 	<p>Atomic Theory</p> <ul style="list-style-type: none"> • Theory of current flow (Electron flow vs. Conventional current flow) • Resistive characteristics of different materials • Conductors, semiconductors, insulators • What is a conductor / semiconductor / insulator? • 2-3 examples of each and their characteristics. No further theory needed • A wire is a conductor, but not all conductors are made of wire (Electrical shock and safety) <p>Types of materials used as conductors: copper, aluminum, gold, silver, steel and nickel chrome wire</p> <ul style="list-style-type: none"> • Specific resistance (No calculations) <p>Negative and positive temperature coefficient. (No calculations)</p>	<p>The Resistor</p> <ul style="list-style-type: none"> - What is a resistor? - Composition of a resistor - Types of resistors - Tolerance (Indicated value vs. measured value) (2% and 5%) - Colour code of resistors (4 band and 5 band resistors) - Power vs. size (1/8W, 1/4W, 1/2W, 2W and 5W) - Measuring the value of resistors - Calculating the value of resistors - Potentiometer (Construction, functional operation, symbols) - Rheostat (Difference between a Potentiometer and Rheostat (Construction, functional operation, symbols)) 	<p>Ohms Law</p> <p>Ohm's Law: $V=IR$ (Ω)</p> <ul style="list-style-type: none"> - Verify Ohm's Law with calculations - Pay attention to prefixes and unit conversions 	<p>Series Circuit as Voltage Divider</p> <ul style="list-style-type: none"> - Kirchhoff's Voltage Divider: <ul style="list-style-type: none"> o $V_T = V_1 + V_2 + \dots + V_n$ (V) <p>Parallel Circuit as a Current Divider</p> <ul style="list-style-type: none"> - Kirchhoff's Current Divider (combination circuits with calculations): <ul style="list-style-type: none"> o $I_T = I_1 + I_2 + \dots + I_n$ (A) 	<p>Series / Parallel Circuits</p> <ul style="list-style-type: none"> - Calculations on combination circuits containing <ul style="list-style-type: none"> > 1 x Series and 2 x Parallel > 2 x Series and 2 x Parallel > 3 x Series and 3 x Parallel <p>Practical: Measure voltage and current in a Series / Parallel Circuit</p> <ul style="list-style-type: none"> > 1 x Series and 2 x Parallel > 2 x Series and 2 x Parallel 3 x Series and 3 x Parallel 	<p>Power</p> <ul style="list-style-type: none"> - Definition of Power - Power calculations: <ul style="list-style-type: none"> o $PT = VI$ (W) o $PT = I^2 R$ (W) o $PT = V^2/R$ (w) <p>Practical: Apply power calculations to Series / Parallel circuits</p>		

	exercise for the workshop											
Resources (other than textbook) to enhance learning	Videos, PowerPoint presentations additional notes ,components Multimeter ,Breadboards Circuit boards electronic software tools and Consumables											
Informal assessment ; remediation	Classwork / Case studies / Worksheets / Homework / Theory and Practical etc.)											
SBA (Formal Assessment)	Assignment											
	PAT Simulation 1 Completed											
	<p>The legislation governing workplaces in relation to COVID – 19 is the Occupational Health and Safety Act, Act 85 of 1993, as amended, read with the Hazardous Biological Agents Regulations. Section 8 (1) of the Occupational Health and Safety (OHS) Act, Act 85 of 1993,</p> <p>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. Examples of safe work practices for SARS-CoV-2 include. Requiring regular hand washing or using of alcohol-based hand rubs. Learners and teachers should always wash hands when they are visibly soiled and after removing any PPE. Keep safe distances and wear a mask at all times.</p> <p>See the document on the workshop safety measures</p>											

National Revised ATP: Grade 10– Term 2 Grade 10 Electrical Technology: Electronics 2021

TERM 2 (51 days)	1: 13-16 Apr (4)	2: 19-23 Apr (5)	3: 26-30 Apr (4)	4: 03-07 May (5)	5: 10-14 May (5)	6: 17-21 May (5)	7: 24-28May (5)	8: 31 May -4 June (5)	9: 07-11 June (5)	10-11: 14-25 June (9 day)
CAPS topic	Power Sources	Power Sources	Electronic Components	Electronic Components	Electronic Components	Electronic Components	Electronic Components	Electronic Components	PAT Consolidation	Revision
Concepts, skills and values	Energy <ul style="list-style-type: none"> • What is energy? • Primary source of energy • Sources of energy, etc. Alternative Energy Solar/ Photovoltaic Cell Solar cell vs Solar panel Generating electricity from the sun, etc.	Introduction of Electronic Components <ul style="list-style-type: none"> • What are electronic components? • Purpose of electronic components 	. Types of Components <ul style="list-style-type: none"> • Switches • SPST, SPDT, DPST, DPDT • Rotary Switch • Slide switches, - Magnetic switches - Key switches Application and practical in simple circuits	Practical: identify/test/components The Capacitor <ul style="list-style-type: none"> - Composition, construction, functional operation, symbol, characteristics curves and values - Basic principles of electrostatic charge <ul style="list-style-type: none"> o $Q=VC$ (Coulomb) o $t=RC$ (Seconds) o $T=5RC$ (Seconds) 	Charging rates and time constant including curves and calculations. <ul style="list-style-type: none"> o $V_{capacitor}=V_{supply} \times 0.636$ (Volt) o $I_{capacitor}=I_{max} \times 0.364$ (Amp) - Graph - Application of capacitors in DC (Examples of smoothing circuit and RC time constant) - Capacitors in series <ul style="list-style-type: none"> o $1CT=1C1+1C2...+1Cn$ (Farad) - Capacitors in parallel <ul style="list-style-type: none"> o $CT=C1+C2+..Cn$ (Farad) 	Practical: Calculation of charge: $Q=VC$ Practical: Calculation of total capacitance in series (2,3 and 4 capacitors) Practical: Calculation of total capacitance in parallel (2,3 and 4 capacitors)	Practical: Charging characteristics of the capacitor. Include drawing of graph from data. Protective Devices <ul style="list-style-type: none"> • Fast Blow and Slow Blow fuses 	Diode <ul style="list-style-type: none"> • Symbol • Diode as a polarised component Forward biasing (Concept only) Reverse biasing (Concept only) Application as rectifier 		
Resources (other than textbook) to enhance learning	Videos, PowerPoint presentations additional notes ,components Multimeter ,Breadboards Circuit boards electronic software ,tools and Consumables									
Informal assessm; remediation	Classwork / Case studies / Worksheets / Homework / Theory and Practical etc.)									
SBA (Formal Assessment)	Term Test									
	<p style="text-align: center;">PAT Simulation 2 completed</p> <p>The legislation governing workplaces in relation to COVID – 19 is the Occupational Health and Safety Act, Act 85 of 1993, as amended, read with the Hazardous Biological Agents Regulations. Section 8 (1) of the Occupational Health and Safety (OHS) Act, Act 85 of 1993, 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. Examples of safe work practices for SARS-CoV-2 include. Requiring regular hand washing or using of alcohol-based hand rubs. Learners and teachers should always wash hands when they are visibly soiled and after removing any PPE. Keep safe distances and wear a mask at all times.</p> <p>See the document on the workshop safety measures</p>									

National Revised ATP: Grade 10– Term 3 Grade 10 Electrical Technology: Electronics 2021

TERM 3 (52 days)	1: 13-16 Jul (4)	2: 19-23 Jul (5)	3: 26-30 Jul (5)	4: 02-06 Aug (5)	5: 10-13 Aug (4)	6: 16-20 Aug (5)	7: 23-27 Aug (5)	8: 30 Aug- 3 Sept (5)	9: 06-10 Sept (5)	10-11: 13-23 Sept (9)
CAPS topic	Electronic Components	Electronic Components	Communication Systems	Communication Systems	Communication Systems	Communication Systems	PAT (project)Consolidation	PAT (project)Consolidation	Revision	Test
Concepts, skills and values	<p>LED</p> <ul style="list-style-type: none"> • Symbol • LED as a polarized component. <p>Forward biasing (Concept only) Reverse biasing (Concept only) Current flow through and voltage across LED The Series Resistor $R_{series} = VT - VLed / I_{LED} \Omega$</p>	<p>Practical:</p> <ul style="list-style-type: none"> • Test the diode and LED for correct function and polarity. • Calculate the value of the series resistor needed to protect an LED. • Build a half wave rectifier using a diode and 50 Hz supply, etc. 	<p>Introduction to Communication Systems</p> <ul style="list-style-type: none"> - Purpose of communication systems - Types of communication systems (What are they?) - Commercial broadcasting (SABC, FM Radio and DSTV etc) - Commercial communication (Telephone systems, security companies, air traffic control, cell phones etc) - Community communication (Disaster management, emergency services, amateur radio, research etc) - Internet communication - Computer networks 	<p>Radio Communication – Basic Concepts of:</p> <ul style="list-style-type: none"> - A radio - An electromagnetic radio wave - Transmitter - Receiver - Feed line - Antenna - Interference & electromagnetic compatibility 	<p>Principles of modulation</p> <ul style="list-style-type: none"> - Frequency - Wavelength - Speed of radio frequency - Units of frequency 	<p>Radio Antenna</p> <ul style="list-style-type: none"> - The relationship between frequency and wavelength – No calculation - Types of radio antenna - Omni directional antenna $\frac{1}{4} \lambda$ - Dipole $\frac{1}{2} \lambda$ - Directional antenna – Yagi-Uda array - Standing Wave Radio (SWR) Good vs. bad SWR Antenna Gain (Gain over an Isotropic antenna) 				
Resources (other than textbook) to enhance learning	Videos, PowerPoint presentations additional notes ,components Multimeter ,Breadboards Circuit boards electronic software ,tools and Consumables									
Informal assessm; remediation	Classwork / Case studies / Worksheets / Homework / Theory and Practical etc.)									
SBA (Formal Assessment)	Term Test									
	<p>PAT Simulation 3 completed</p> <p>The legislation governing workplaces in relation to COVID – 19 is the Occupational Health and Safety Act, Act 85 of 1993, as amended, read with the Hazardous Biological Agents Regulations. Section 8 (1) of the Occupational Health and Safety (OHS) Act, Act 85 of 1993, 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. Examples of safe work practices for SARS-CoV-2 include. Requiring regular hand washing or using of alcohol-based hand rubs. Learners and teachers should always wash hands when they are visibly soiled and after removing any PPE. Keep safe distances and wear a mask at all times. See the document on the workshop safety measures</p>									

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TERM 4 (47 days)	1: 05-08 Oct (4)	2: 11-15 Oct (5)	3: 18-22 Oct (5)	4: 25-29 Oct (5)	5: 01-05 Nov (5)	6: 08-12 November (5)	7: 15-19 Nov (5)	8: 22-26 Nov (5)	9: 29 Nov – 3 Dec (5)	10- 06-08 Dec (3)
CAPS topic	Principles of Magnetism	Principles of Magnetism	Principles of Magnetism	Principles of Magnetism	Principles of Magnetism	Principles of Magnetism	Principles of Magnetism	Finalisation and consolidation of PAT and Revision	Examination	Examination
Concepts, skills and values	<p>Introduction to Magnetism</p> <ul style="list-style-type: none"> - Define magnetism e.g. natural, electro-magnetism - Basic principles of magnetism - Rules of magnetism <p>Practical: Magnetic fields around a permanent magnet using iron filings</p>	<p>Magnetic Fields</p> <ul style="list-style-type: none"> - Concepts of: - Magnetic Flux (ϕ) - Flux Density (β) - Inductance (L) - Definition of inductor - No calculation <p>Demonstration: Oersted's Experiment (Screwdriver rule)</p>	<p>Types of Inductors and Inductor cores</p> <ul style="list-style-type: none"> - Air Core - Laminated Core - Ferrite Core - Torroid Core <p>Demonstration: Magnetic fields around a coil using iron filings</p> <p>Demonstration: Magnetic fields around a coil with and without a core</p>	<p>Calculations:</p> <ul style="list-style-type: none"> - Coils in series (Inductor) $L_{series}=L1+L2.....+Ln$ (Henry) - Coils in series (Inductor) $L_{parallel}=1L1+1L2..+1Ln$ (Henry) 	<p>Functional operation and application of relays / solenoids</p> <ul style="list-style-type: none"> - Symbol - Principle of operation - Construction of a relay - Parts of a relay - Normally open / normally closed 	<p>Practical: Testing a relay using a multimeter</p> <p>Demonstration: Wire a relay and light to a switch and operate the relay</p> <p>Demonstration: Latching circuit with a relay</p>	<p>Introduction to a simple Series DC Motor</p> <ul style="list-style-type: none"> - Basic parts of a DC motor - Current flow in a DC motor and direction of rotation - Fleming's Right-Hand Rule - Armature - Yoke / Magnetic poles - Bearings / Brushes in endplates - Brushes - commutation <p>Demonstration: Show how the direction of rotation in DC motors can be changed</p>			
Resources (other than textbook) to enhance learning	Videos, PowerPoint presentations additional notes ,components Multimeter ,Breadboards Circuit boards electronic software tools,and Consumables									
SBA (Formal Assessment)	Examination									