

National Revised ATP: Grade 10– Term 1 Grade 10 Electrical Technology: Digital 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
Topics /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 / Electrocutation 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) Negative and positive temperature coefficient. (No calculations) 	<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: $V=IR (\Omega)$</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 $V_T = V_1 + V_2 + \dots + V_n (V)$ Parallel Circuit as a Current Divider - 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 assessm; 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: Digital 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: 24-28 May (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
Topics /Concepts, Skills and Values	Energy • 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.	Potential Difference (PD) - Understanding the concept of PD o $V=EQ$ (Volt) Electromotive Force (EMF) - Understanding the concept of EMF - Difference between EMF and PD o $V_{EMF}=V_{PD}+V_r$ (Volt) Internal Resistance - What is Internal Resistance? - Advantages / disadvantages of Internal resistance - Internal resistance calculations o $E_{EMF}=IR+Ir$ (Volt) o $R_{TOTAL}=R+r$ (Ω)	Introduction of Electronic Components • What are electronic components? • Purpose of electronic components.	Types of Components • 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 - Composition, construction, functional operation, symbol, characteristics curves and values - Basic principles of electrostatic charge o $Q=VC$ (Coulomb) - Time constant o $t=RC$ (Seconds) o $T=5RC$ (Seconds)	Charging rates and time constant including curves and calculations. $V_{capacitor}=V_{supply}\times 0.636$ (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 o $1CT=1C1+1C2...+1Cn$ (Farad) - Capacitors in parallel 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 • Fast Blow and Slow Blow fuses Diode • 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 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,</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 3 Grade 10 Electrical Technology: Digital 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 Topics	Electronic Components	Electronic Components	Logics	Logics	Logics	Logics	PAT (project)Consolidation	PAT (project)Consolidation	Revision	Test
Topics /Concepts, Skills and Values	LED • Symbol • LED as a polarized component. Forward biasing (Concept only) Reverse biasing (Concept only) Current flow through and voltage across LED The Series Resistor $R_{series} = \frac{V_T - V_{Led}}{I_{LED} \Omega}$	Practical: • 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.	Introduction to Logics > Digital and Analogue (Explain the difference) > The use of number systems in digital electronics > Decimal to Binary	Introduction to Logics > Binary to Decimal Addition and subtraction of Binary (Test in Decimal)	Truth Table & Boolean Expression (IEC and American Symbols) • Basic 2 input logic functions of: > NOT > AND > NAND (Combination of AND gate and a NOT gate) > OR > NOR (Combination of OR and NOT) > X-OR > X-NOR • Equivalent circuits using switches to simulate gates	Practical: Simulation of logic circuits using switches/relays Practical: Simulation of logic gates using Logic IC's				
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									
	PAT Simulation 3 Completed 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									

National Revised ATP: Grade 10– Term 4 Grade 10 Electrical Technology: Digital Electronics 2021

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 Topics	Logics	Logics	Principles of Magnetism	Principles of Magnetism	Principles of Magnetism	Principles of Magnetism	Principles of Magnetism	Principles of Magnetism	Revision and PAT Moderation	Examination	Examination
Topics /Concepts, Skills and Values	<p>Diode Logic</p> <ul style="list-style-type: none"> Principle of operation of Diode Logic Equivalent circuit diagrams of Logic gates using Diode Logic <p>Practical: Simulation of logic circuits using Diode Logic. AND, OR, NAND, NOR, X-NOR</p>	<p>Combinational Circuits</p> <ul style="list-style-type: none"> Definition of combinational circuits Combinational circuits using 2, 3 and 4 Operands Truth Table & Boolean Expression (IEC and American Symbols) Basic 2 input logic functions of combinational circuits AND/OR/NOT/NOR/NAND / XOR / XNOR 4 x 2-input Gate combinations maximum <p>Practical: Simulation of combinational logic circuits using Logic ICs</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) <ul style="list-style-type: none"> $L_{series} = L_1 + L_2 + \dots + L_n$ (Henry) Coils in series (Inductor) <ul style="list-style-type: none"> $L_{parallel} = \frac{1}{\frac{1}{L_1} + \frac{1}{L_2} + \dots + \frac{1}{L_n}}$ (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 <ul style="list-style-type: none"> 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 communication <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										
Informal Assessment: Remediation	Classwork / Case studies / Worksheets / Homework / Theory and Practical etc.)										
SBA (Formal)	Examination										