National Revised ATP: Grade 10– Term 1Grade10 Electrical Technology: Power Systems 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 Mar 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	**Responsibilities** - What are your rights in the workshop? - What are your responsibilities in the workshop? **General Workshop Rules** --Housekeeping (Health hazards, safety hazards, workshop layout, workshop management) **Workshop Safety** - 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 Note: Clean the workshop on a weekly basis **Emergency Procedures** - Placement of the Master Switch - Critical versus non-critical emergencies - Medical emergencies - Electrical shock / Electrocution procedures - Evacuation procedures - Principles of fire fighting **Practical:** Perform an evacuation exercise for the workshop	**Basic First Aid** - 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 **Practical:** Perform a first aid exercise (Choose a topic from basic first aid). **Chemical Safety** (Printed Circuit Board Manufacturing) - 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	**Atomic Theory** • 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) Types of materials used as conductors: copper, aluminum, gold, silver, steel and nickel chrome wire • Specific resistance (No calculations) Negative and positive temperature coefficient. (No calculations)	**The Resistor** - 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)	**Ohms Law** Ohm's Law: V=IR (Ω) - Verify Ohm's Law with calculations - Pay attention to prefixes and unit conversions	Series Circuit as Voltage Divider - Kirchhoff's Voltage Divider: o $VT = V1 + V2 + \cdots Vn\ (V)$ Parallel Circuit as a Current Divider - Kirchhoff's Current Divider (combination circuits with calculations): o $IT = I1 + I2 \ldots + In\ (A)$	**Series / Parallel Circuits** - Calculations on combination circuits containing ➢ 1 x Series and 2 x Parallel ➢ 2 x Series and 2 x Parallel ➢ 3 x Series and 3 x Parallel **Practica**l: Measure voltage and current in a Series / Parallel Circuit ➢ 1 x Series and 2 x Parallel ➢ 2 x Series and 2 x Parallel 3 x Series and 3 x Parallel	**Power** - Definition of Power - Power calculations: o $PT = VI\ (W)$ o $PT = I2\ R\ (W)$ o $PT = V2R\ (w)$ **Practical:** Apply power calculations to Series / Parallel circuits		

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 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 2 Grade10 Electrical Technology: Power Systems 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**	**Electronic Components**	**Electronic Components**	**Electronic Components**	**Domestic Installations**	Domestic Installations	Domestic Installations	**PAT Consolidation**	**Revision Assignment**	**Revision**
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.	**Introduction of Electronic Components** • What are electronic components? • Purpose of electronic components, etc. **Types of Components** • Switches • SPST, SPDT, DPST, DPDT • Rotary Switch • Slide switches, etc.	**Protective Devices** • Fast Blow and Slow Blow fuses **Diode** • Symbol • Diode as a polarised component • Forward Biasing, etc. **LED** • Symbol • LED as a polarized component, etc.	**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.	**Electrical energy Distribution- supplier to the consumer** • Domestic Installations • Sequence of connection from the supplier to consumer-Block-diagram • SANS 10142-1 Installation regulations ➢ Aim of the SANS 10142-1-Low Voltage Installations ➢ Chapter 3 Definitions ➢ Chapter 5 fundamental requirements ➢ Chapter 5.1 safety Chapter 5.2 basic provisions	Identification of the parts, functions, care, correct and safe use of the following tools: • Screwdrivers (Flat and Phillips) • Files (Flat, Square, Round, Triangular and Half round) • Side Cutter • Long Nose pliers • Combination pliers Practical Skills and Techniques • Safe and correct use of tools	**The Distribution Board** • Wiring diagram DB Board • Distribution Board wiring principles • SANS Chapter 6.6.1-Distribution boards :general • SANS Chapter 6.6.2-Distribution boards :Bus bars • SANS Chapter 6.7 – Protection • SANS Chapter 6.10 – Fuses **Protective Devices : Miniature Circuit Breakers** • Principle of operation • Electromagnetic type • Thermal type • Ratings • SANS Chapter 6.8 – Circuit breakers • SANS Chapter 6.9 – Disconnecting devices **Practical :** Wire a Distribution Board according to the SANS requirements			
Resources (other than textbook) **to enhance learning**	Videos, PowerPoint presentations additional notes ,components Multimeter ,Breadboards Circuit boards electronic software ,tools and Consumables Identification of the parts, functions, care, correct and safe use of the following tools: • Screwdrivers (Flat and Phillips) • Files (Flat, Square, Round, Triangular and Half round) • Side Cutter • Long Nose pliers • Combination pliers Practical Skills and Techniques • Safe and correct use of tools The Distribution Board • Wiring diagram DB Board • Distribution Board wiring principles • SANS Chapter 6.6.1-Distribution boards :general • SANS Chapter 6.6.2-Distribution boards :Bus bars									

	• SANS Chapter 6.7 – Protection • SANS Chapter 6.10 –Fuses Protective Devices : Miniature Circuit Breakers • Principle of operation • Electromagnetic type • Thermal type • Ratings • SANS Chapter 6.8 – Circuit breakers • SANS Chapter 6.9 – Disconnecting devices Practical : Wire a Distribution Board according to the SANS requirements				
Informal assessm; remediation	Classwork / Case studies / Worksheets / Homework / Theory and Practical etc.)				
SBA (Formal Assessment	**Term Test**				
	PAT Simulation 2 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 3 Grade10 Electrical Technology: Power Systems 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	Domestic Installations	Domestic Installations	Domestic Installations	Domestic Installations	Domestic Installations	Domestic Installations		**PAT (project)Consolidation**	**Revision**	**Test**
Concepts, skills and values	**Protective Devices : Earth Leakage** • Principle of operation • Safety considerations • Cabling and cable sizes • Correct identification and fitting of wiring for domestic installation • Cable termination • Glands (PVC pressure glands) Acknowledgement of indigenous knowledge systems (PRATLEY connector boxes)	**Pipe Sizes** • Bending , fitting , sawing • PVC conduit and fittings • Practical : Install PVC piping for the domestic circuits **Protective Devices Earthing** • The earth spike , lightning arrestor , earth systems and bonding (Acknowledgement of indigenous knowledge systems) (Earth leakage developed in SA) • SANS Chapter 6.11 – Consumers earth terminal • SANS Chapter 6.12 – Earthing • SANS Chapter 6.13 - Bonding **PAT:** Assembly and soldering of components on PC Board	**Safe Use and Care of Instruments** **• Continuity Tester** **• Analog Multimeter (Focus on demonstrations)** **• Digital Multimeter** **• Megger / Insulation Tester** • • Polarity tests (plug Tester) **Practical:** Wire a lighting sub-circuit with two way and intermediate switching **PAT:** Enclosure manufacturing/finishing	**Testing and Troubleshooting (After Installation)** • Earth continuity testing • Insulation resistance tests between conductors • Insulation resistance tests between conductors and earth	**Sub – circuits** • **Lighting Circuit** ➢ Lights in series (Voltage and current measurement) Lights in parallel (Voltage and current measurement	➢ Two way switching (SPDT) ➢ Intermediate Light switching (DPDT) **Plug Circuits** SANS Chapter 6.15 – Socket outlets	**Practical:** Wire two plugs into a sub-circuit			
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 Grade10 Electrical Technology: Power Systems 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 topic	Domestic Installations	**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	**Practical:** Do an insulation resistance test on the domestic installation **Practical:** Do a polarity test on the live domestic installation **PAT Project completed and moderated**	**Introduction to Magnetism** - Define magnetism e.g. natural, electro-magnetism - Basic principles of magnetism - Rules of magnetism **Practical**: Magnetic fields around a permanent magnet using iron fillings	Magnetic Fields - Concepts of: - Magnetic Flux (Ø) - Flux Density (β) - Inductance (L) - Definition of inductor - No calculation Demonstration: Oersted's Experiment (Screwdriver rule)	**Types of Inductors and Inductor cores** - Air Core - Laminated Core - Ferrite Core - Torroid Core **Demonstration:** Magnetic fields around a coil using iron filings **Demonstration**: Magnetic fields around a coil with and without a core	**Calculations:** **-** Coils in series (Inductor) o $Lseries$=$L$1+$L$2.....+Ln (Henry) - Coils in series (Inductor) o $Lparallel$=1$L$1+1$L$2..+1Ln (Henry) **Functional operation and application of relays / solenoids** - Symbol - Principle of operation - Construction of a relay - Parts of a relay - Normally open / normally closed	**Practical:** Testing a relay using a multimeter **Demonstration:** Wire a relay and light to a switch and operate the relay **Demonstration:** Latching circuit with a relay	**Introduction to a simple Series DC Motor** - 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 **Demonstration**: Show how the direction of rotation in DC motors can be changed			
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**									