INDUSTRIAL TECHNOLOGY

ELECTRICAL TECHNOLOGY
LEVEL 9

Topic	Skills	Knowledge	Understanding	Attitude	Content	Methods/ Strategies	Evaluation	Area of Integration
Types of Circuits.	List the types of Circuits. Identify the components of a simple circuit. Reduce the current and voltage in series and parallel circuit. Draw a circuit using symbols.	The basic components of a simple circuit. Types of electrical circuits, relationships between current and voltage in series and parallel circuits. To draw a circuit using the electrical symbols.	List the components of s simple circuit. List types of circuits, select the components and construct a simple circuit. Draw circuit in series and parallel and calculate the voltage and current. Draw circuits using symbols.	Select the components of a circuit and build it. Trace faulty circuit and effect repairs. Differentiate between the types of circuit. Design a series of parallel circuit and calculate the voltage and current in each component.	Simple circuits – Source, load, conductor, control and protection. Series and parallel circuits. Current and voltage relationships. Series and parallel circuit laws. Calculations. Tuned circuits, RLC network, circuits and symbols of components.	Explain and let students identify the types of circuits. Select the components of a simple circuit and construct the circuit. Identify source, load, conductor, controls and protection. Connect circuits in series and parallel and calculate the voltage in components. Draw circuits using components.	Ask students to select the components of a simple circuit and construct it. Connect circuits in series and parallel and calculate the current and voltage in each component. Draw various RLC circuits using symbols.	Integrated Science Physics Mathematics.

Topic	Skills	Knowledge	Understanding	Attitude	Content	Methods/ Strategies	Evaluation	Area of Integration
Power and Energy.	Define power and energy and state their units. Perform calculation using the formula. Calculate power in series and parallel circuits. Read a KWH meter. Calculate simple energy bills.	The symbol definition and units of power and energy? How to calculate total power and energy. Perform calculation involving power and energy in a series and parallel circuit. The power consumed by a consumer. The cost of energy consumed.	What are the definitions of power and energy? How to calculate total power and energy in a circuit. To construct series and parallel circuits and calculate the power, energy and cost of energy consumed.	Being able to define the power and energy consumed and state the units. Calculate the power and energy in a simple series and parallel circuits. Calculate the power, energy and energy bill consumed.	Definition of power and units of measurement manipulation of power formula. Power in series and parallel circuits. Kilowatt hour meter - Analogue and Digital types. Calculations of simple rates, flat rates and block rates, fuel charges. Calculations for energy bills for consumers.	Explain and derive power and energy formulae and state units. Manipulate power and energy formulae. Connect circuits in series and parallel and calculate the power and energy consumed. Calculate simple rates – flat and block rates. Calculate energy bill for a consumer.	Ask students to define power and energy, state units and multiples. Calculate power and energy in circuits. Manipulate formula and calculate other quantities. Calculate energy rates and energy consumed.	Integrated Science Physics

Topic	Skills	Knowledge	Understanding	Attitude	Content	Methods/ Strategies	Evaluation	Area of Integration
Primary	Define a primary and secondary cell. Convert chemical energy to electrical energy. Connect cell. Convert Chemical energy to electrical energy. Connect cells in series and parallel and calculate total voltage, calculate EMF & PD. Maintain secondary cells.	What is a primary and secondary cell? Change chemical energy to electrical energy. The connection of cells in series and parallel. Calculate EMF, PD and resistance of cells. Maintain secondary cells.	The difference between a primary and secondary cell. How chemical energy changes to electrical. The connection of cells in series and parallel. Calculation of EMF and Pd and the resistance f cells. How to service and maintain a secondary cell.	An awareness of primary and secondary cells. Where the cells are used and the reasons. The connection of cell in series and parallel. Calculating EMP and Pd and internal resistance of cells. Service and maintain secondary cells.	Primary and secondary cells. Conversion of chemical energy to electrical energy. Simple voltaic cells wet and dry cells. Definition of EMF and PD cells in series and parallel and total voltages. Internal resistance advantages of lead acid and alkaline cells charging secondary cells. Hydrometer.	Describe and draw primary and secondary cells. Explain energy conversion, connect cells in series and parallel and calculate total voltage output Calculate EMF and PD and resistance of cells. Explain internal resistance of cells. State advantages of lead acid and alkaline cells. Charging cells. Use of hydrometer.	Ask students to draw the structure of primary and secondary cells and explain the energy conversion. Connect cells in series or parallel and calculate the resultant voltages. Calculate internal resistance of cells. Demonstrate the use of the hydrometer.	Integrated Science Mathematics

Topic	Skills	Knowledge	Understanding	Attitude	Content	Methods/ Strategies	Evaluation	Area of Integration
Magnetism and Electro-magnetism.	Explain principle of magnetism and state the laws of magnets. List types of magnetic materials. Wind coil for an electro-magnet, draw magnetic field around current carrying conductor plot magnetic field around solenoid. Determine direction of force. Flux and energy calculations	Principle of magnetism. Laws of magnetism. Types of magnetic materials. Principle shielding. Wind a coil for an electro-magnet. The direction of magnet field around a current carrying conductor. Find the direction of source. Calculate flux and energy.	The principle of magnetism. Laws of magnetism. Types of magnets and magnetic materials. How to wind a coil for an electromagnet. Determine the direction of magnet field around a current carrying conductor. Plotting of magnetic field around a solenoid. Calculate the flux and energy.	Be able to explain the principle of electro-magnetism and laws of Magnetism. List and identify magnetic and non-magnetic materials. To plot magnet fields around a bar-magnet and a current carrying conductor. Calculate the flux and energy in magnets.	Molecular theory of magnetism. Laws of magnets. Properties of magnets. Magnetic, non-magnetic and diamagnetic materials. Magnetic shielding. Electromagnets direction of magnetic fields. Direction for current and field in conductor and solenoid. Force between conductors un parallel. Calculations of flux-density, energy stored and force and their units.	Explain the principle of magnetism. State the laws of magnetism. List properties of magnets. List magnetic, non-magnetic and diamagnetic materials. Plot magnetic fields around magnets, current – carrying conductors and solenoids. Determine the force between parallel conductors. Calculate flux. Density,energy stored and force. State their units.	Explain the principle of magnetism. State the laws of magnetism. List properties of magnets. List magnetic and non- magnetic materials. Plot magnetic fields around magnets, conductor carrying current, parallel conductor and solenoids. Determine the force between	Integrated Science Mathematics

Topic	Skills	Knowledge	Understanding	Attitude	Content	Methods/ Strategies	Evaluation	Area of Integration
Electrical Measuring Devices and Measure ment.	Sketch and label the moving coil and the moving iron meters. Connect instruments in circuits. Read and interpret non-linear scales. Calculate series and shunt resistances. Explain the Wheat-stone bridge. Outlining factors which affect sensitivity of meters.	The structure and parts of the moving iron and moving coil instrument. How to connect instrument in circuits. To read and interpret scales. Calculate series and shunt resistances operation of Wheat-stone bridge. Factors affecting sensitivity of meters.	The structure of and use of the instruments. The connections for meters in circuits. Reading and interpreting scales on meters. Calculate series and shunt resistances. How the wheat stone bridge operates. The factors, which affect the sensitivity of instruments. Patterns of waveforms.	Label and describe how to connect moving-iron and moving-iron meters correctly. Read meters and scales accurately. Calculate the resistance of series and shunt connections. Use the wheat stone bridge Be aware of how sensitive instruments are.	Moving-coil and moving-iron instrument. Precautions in using measuring devices – voltmeter, ohmmeter, wattmeter and multimeter. Linear and non-linear scales. Use of series and shunt resistances. The Wheat-stone bridge. Sensitivity of meters. Waves:- square sawtooth, sine wave, controls. Make voltage and frequency measurement using oscilloscope Function of and application of signal generators.	Draw diagrams to show structure and describe the meters. Outline precautions when using measuring devices. Name the meters and show how to connect them into circuits. Read and interpret meter scales -use of series and parallel resistances. Recognise the sensitivity of instruments.	Sketch and label the structure of instruments. Connect instruments in circuits and read, interpret and record values obtained. Calculate series and parallel resistances. Measure voltage and frequencies on the oscilloscope. Draw various wave forms from oscilloscope.	Integrated Science Physics Mathematics

Topic	Skills	Knowledge	Understanding	Attitude	Content	Methods/ Strategies	Evaluation	Area of Integration
			The measurement of voltage and frequencies on the oscilloscope. The use of signal generator to supply wave forms to circuits.	Use the oscilloscope to measure voltage and frequencies. Display wave-forms from signal generators.	Make voltage and frequency measurements using oscilloscope. Function of and application of signal generators.	Draw waveforms, square sawtooth, sine wave and controls. Measurement voltages and frequencies with oscilloscope. Explain and note the application of signal generators.	Use signal generator to provide various wave-forms.	

Topic	Skills	Knowledge	Understanding	Attitude	Content	Methods/ Strategies	Evaluation	Area of Integration
Protective Devices.	Be able to define short circuits and overloads. List methods of short circuit and overload protection. Test and replace fuses and set circuit breakers for various equipment.	What are short circuits and overloads? Protect circuits from overload. How to find a blown fuse and rewire it, and reset a circuit breaker. What rate of fuse wire to use. Ratings of circuit breakers.	A circuit will be interrupted when a short circuit or an overload occurs. To identify a blown fuse and repair it or reset a circuit breaker. The current rating of fuses and circuit breakers.	Avoid overloading a circuit. Identify a short circuit and an overload. Uses of fuses The current rating of fuses and circuit breakers of the appropriate ratings. Protect appliances and equipment with correct fuse ratings.	Concept of short circuits, overloads and dangers of short circuits. Method of overload protection. Fuses, circuit-breakers, bimetallic devices. Types of fuses, and circuit breakers used in buildings and home equipment. Fusing factors, current ratings, loading, selection of fuses and circuit breakers.	Define short circuits and overloads. List methods of short circuits and overload protection. List circuit faults and locate blown fuses and tripped circuit-breakers and replace same. Determine the ratings of fuses and circuit breakers for equipment.	Explain what is short circuit and an overload. Identify methods of short circuit and overload protection. Trace faulty circuit and test and replace fuses and reset circuit-breakers. Choose ratings of fuses and circuit-breakers.	Integrated Science Physics