

INDUSTRIAL TECHNOLOGY

ELECTRICAL TECHNOLOGY LEVEL 9

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

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| Power and Energy. | <p>Define power and energy and state their units.</p> <p>Perform calculation using the formula.</p> <p>Calculate power in series and parallel circuits.</p> <p>Read a KWH meter.</p> <p>Calculate simple energy bills.</p> | <p>The symbol definition and units of power and energy? How to calculate total power and energy.</p> <p>Perform calculation involving power and energy in a series and parallel circuit.</p> <p>The power consumed by a consumer.</p> <p>The cost of energy consumed.</p> | <p>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.</p> | <p>Being able to define the power and energy consumed and state the units.</p> <p>Calculate the power and energy in a simple series and parallel circuits.</p> <p>Calculate the power, energy and energy bill consumed.</p> | <p>Definition of power and units of measurement manipulation of power formula.</p> <p>Power in series and parallel circuits.</p> <p>Kilowatt hour meter - Analogue and Digital types.</p> <p>Calculations of simple rates, flat rates and block rates, fuel charges.</p> <p>Calculations for energy bills for consumers.</p> | <p>Explain and derive power and energy formulae and state units.</p> <p>Manipulate power and energy formulae.</p> <p>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.</p> | <p>Ask students to define power and energy, state units and multiples. Calculate power and energy in circuits.</p> <p>Manipulate formula and calculate other quantities.</p> <p>Calculate energy rates and energy consumed.</p> | <p>Integrated Science</p> <p>Physics</p> |

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

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

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

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| | | | <p>The measurement of voltage and frequencies on the oscilloscope.</p> <p>The use of signal generator to supply wave forms to circuits.</p> | <p>Use the oscilloscope to measure voltage and frequencies.</p> <p>Display wave-forms from signal generators.</p> | <p>Make voltage and frequency measurements using oscilloscope.</p> <p>Function of and application of signal generators.</p> | <p>Draw waveforms, square sawtooth, sine wave and controls.</p> <p>Measurement voltages and frequencies with oscilloscope.</p> <p>Explain and note the application of signal generators.</p> | <p>Use signal generator to provide various wave-forms.</p> | |

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

