**International and National Perspectives of Technology Education**

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| **TOPIC** | **CONTENT** |
| Different perspectives of the term “Technology Education | * What does the South African teacher education   system understand by theterm “Technology  Education”   * What do teachers and teacher education systems inother countries understand by the term “Technology   Education”   * Clarifying the difference between Technology   Education and Science from different perspectives   * The characteristics and scope as well as the core concepts of Technology Education from various perspectives |
| Historical Development of Technology Education as part of the school curriculum | * History of Technology Education as part of the   school curriculum in different countries   * Different perspectives on the role of Technology as part of the school curriculum * Different Technology Teacher Education curriculums In different countries * Impact of Technology Education for the education philosophy and conceptual   framework guiding teacher preparation |
| International and national views on various aspects of Technology Education | * What do technology teachers understand as the   nature and purpose of Technology Education?   * What constitutes the Technology teachers knowledge of the Technology Education curriculum? * What are the pedagogies that teachers believe are suitable to teaching Technology? * What types of assessment activities do the   Technology teachers utilize and how are these  related to the content?   * What technological teaching and learning resources do Technology teachers use? * How do the Technology teachers integrate   Indigenous Technology systems in their teaching |
| Different perspectives of Technology Teachers | * Knowledge of the educational aims, purposes and values in their educational contexts regarding Technology Education * Orientation towards the teaching of Technology   including their knowledge of the subject and their beliefs about it   * Knowledge of the curriculum in terms of what and when to teach, why, what and how to assess, instructional strategies, general pedagogical knowledge and pedagogical content knowledge * The learners understanding of the subject and the learners’ characteristics |

**Principles of Drawing in the context of Mechanical, Civil and Electrical Technology**

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| **TOPIC** | **CONTENT** |
| Design Elements and Basic Principles of  Design, Free hand Drawing and Geometrical  Drawing: Basic Introduction | * Line-uses of lines, types of lines * Colour-attributes of colour * Shapes-categories of shapes * Texture * Space * Form * Loci-helix,cam,mechanisms * Unity-methods * Point, Line and plane * Balance-symmetrical and asymmaterical, focal   point, areas of interest   * Hierachy * Scale * Dominance * Similarity and Contrast * Techniques of free hand drawing   **Plane Geometrical Drawing**   * Square * Rectangle * Triangle   **Solid Geometrical Drawing**   * Sphere * Cylinder * Core * Cube * Prism * Polygons * Ellipse |
| Mechanical Engineering Drawing: Basic Introduction | * Machines and machining * Machine parts * Castings * Simple assemblies * Complex assemblies * Welding |
| Civil Engineering Drawing: Basic Introduction | * Floor plans, * Foundation to slab * Foundation to ceiling * Foundation to roof, electrical fixtures and site plans * Perimeters and floor areas * Annotations, tables, dimensioning and scales * Hatching * Roads * Bridges * Buildings * Dams |
| Electrical Engineering Drawing: Basic Introduction | * Motors * Starters * Panels * Generators * Transformers * Poles and towers * Wiring Diagrams-paralell and series |

**Integrated Systems for Technology Education**

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| **TOPIC** | **CONTENT** |
| Introduction and Types of machines | * History of Machines- Industrial Revolution, Mechanisation and Automation * Explanation of Systems * Explanation of Mechanical Systems * Explanation of Electrical Systems * Simple machines: wheels and axles   pulley systems  chain and sprocket systems  gear systems  levers and linkages  crank and slider  cam and follower   * Clocks: atomic,watch, pendulum, quartz * Compressors and Pumps: Archimedes, screw,   Eductor-jet, hydraulic ram, pump, Trompe,  Vacuum pump   * Heat Engines External Combustion Engine-   steam, stirling  Internal Combustion Engine-  Internal reciprocity engine,  gas turbines |
| Turbines and Linkages | * Gas turbines * Jet turbines * Steam turbines * Water turbines * Wind turbines * Wind generator * Windmills * Watts linkage * Hoeken’s linkage * Chebyshev’s linkage * Scott Russel linkage * Peaucellier Lipkin Linkage * Sarrus Linkage * Klan Linkage |
| Types of Motion, Energy, Mechanisms and  Motors | * Linear * Rotary * Reciprocity * Oscillating * Potential * Kinetic * Friction * Planar mechanisms * Spherical mechanisms * Spatial mechanisms * Electric motors * Hydraulics * Pneumatics |
| Electrical Systems | * Common components and concepts of an electrical system : batteries   : electromagnetic switches and relays  : magnetic switches  : sensors  : temperature senders  : speed sensors  : potentiometers  : circuit protection  : fusible links  : load devices  : glow plugs  : solenoids  : starter motors  : alternators  : diodes  : ignition systems  : maintenance |
| Electrical Principles | * Electricity * Basic electrical system requirements * Basic circuits and circuit diagrams * Basic electrical elements: current, voltage, resistance, Ohms law * Electrical tools, measurement and testing: test lights, digital multimeter, diagnostics display meter, multimeter,voltmeter,ohmmeter, clamp(ammeter)meter |
| Electrical energy and power and Indigenous knowledge Systems | * Electromagnets * electric motors * fuses * transformers * electrocution and safety * Interrelationship between Indigenous Knowledge Systems, Mechanical Technology, society and the environment * Appropriate technology for sustainable solutions |

**Materials and Structures for Technology Education**

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| **TOPIC** | **CONTENT** |
| Introduction to materials in modern  technology | * Structure of materials and their underlying principles * Characteristics and composition of the following materials: steel, ferrous metals and alloys, non-ferrous metals and alloys, cast iron, thermo plastic, metals, ceramics, polymers * Properties of materials in terms of mechanical, thermal, environmental and electrical properties for example toughness, hardness, elasticity, plasticity, ductility, malleability, brittleness |
| Distinguishing between different materials | * Visual inspection * Density test * Sound test * Filing test * Spark test * Break test |
| Manufacturing processes of materials | * Applied thermodynamics, heat transfer, energy conversion * Fluid mechanics and fluid dynamics * Mechanism design (including kinematics and dynamics) * Manufacturing technology or processes * Casting and castability * Bulk forming * Sheet metal forming * Machining * Joining * Powder metallurgy |
| Methods for enhancing the properties of  Materials | * Hardening- work, case, solid solution, precipitation, grain boundary strengthening and transformation hardening * Tempering * Annealing * Normalising |
| Introduction to Structures | * Purpose of structures * Dimensions of structures * Materials and resources for structures |
| Types of Structures and essential requirements for structures | * Natural-frame and shell * Man- made- frame and shell * Designing a structure * Features of a good structure-strength, stability, rigidity * Forces in framework structure |

**Computer-Aided Design (CAD) in the context of Mechanical, Civil and Electrical Technology**

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| **Topic** | **CONTENT** |
| Introduction | * Introduction to CAD * Uses of CAD * Types of CAD * Advantages |
| AutoCAD | * Main functions of AutoCAD * Components of AutoCAD * of CAD |
| Using CAD for Drawing |  |
| Commands | * Basic commands * Display commands * Editing Commands |
| Dimensioning and Projections | * Dimensioning and Text * Orthographic and Isometric Projection * Sectional View |
| Modelling | * 2D and 3D modelling * Co-ordinate Systems and Cartesian Co * Ordinative systems |