ZIMBABWE

MINISTRY OF PRIMARY AND SECONDARY EDUCATION

BUILDING TECHNOLOGY AND DESIGN SYLLABUS

FORMS 1 – 4

2024 - 2030

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Table of Contents

1.0 PREAMBLE

1.1 Introduction

The Heritage Based Building Technology and Design syllabus is designed for forms 1-4 learners. The Theoretical, Practical and problem - solving approaches are at the centre of implementing this syllabus. The syllabus embraces inclusivity and gender equity in the learning and teaching of Building Technology Design. This approach encourages the acquisition and development of 21st century technical skills, knowledge and attitudes which are relevant to the requirements of the building trade, construction industry, further studies and self-reliance.

1.2 Rationale

The philosophy of the Zimbabwean Constitution provides for decent housing and shelter for all which makes it necessary for the learning/teaching of Building Technology and Design in schools. This course encourages learners to employ 21st century problem solving skills which promote the application of scientific and technological knowledge. The learning areas will enable learners to appreciate the dignity of labour, integrity, Ubuntu/Unhu/Vumunhu and patriotism. It is therefore imperative that the learners are afforded an opportunity to study this learning area as they pursue their education and prepare for future careers and entrepreneurial activities.

1.3 Summary of Content

This syllabus covers theory and practical activities. Areas such as digital drawing and design, material science, use and care of building tools and equipment, construction processes, estimations, application of by-laws, health and safety issues build up the content of the heritage-based Building Technology and Design.

1.4 Assumptions

It is assumed that learners have:

- drawing and measuring skills
- knowledge of some building tools and materials
- knowledge of different building designs
- information communication technology skills
- numeracy and scientific skills
- engaged in cooperative work and self-assessment activities

1.5 Cross- Cutting Themes

In order to foster competency development in the learner, the following cross-cutting issues have to be taken into consideration:

- Gender
- Children's Rights and responsibilities
- Health and Life Skills
- Disaster Risk Management
- Climate Change
- Information Communication Technology
- Environmental Management

2.0 PRESENTATION OF THE SYLLABUS

The Building Technology and Design Syllabus is a single document for Form 1 - 4. It contains the preamble, aims, objectives, syllabus topics, cross cutting themes, methodology, time allocation, scope and sequence, competency matrix and the scope and sequence chart show progression of topics from Form 1 - 4, while the syllabus matrix gives details of the content to be covered and a list of suggested notes and resources to be used during learning and teaching.

3.0 AIMS

The syllabus aims to help learners to:

3.1 appreciate the importance of Building Technology and Design for sustainable socio- economic development of the country

3.2 develop knowledge, skills and attitudes which will enable them to effectively and efficiently execute construction activities

3.3 understand principles of occupational health and safety in the construction industry

3.4 acquire a scientific knowledge of building materials and their utilisation in a sustainable manner

3.5 appreciate the appropriate use and care of tools and equipment to produce desired results

3.6 develop socio - psychomotor skills

3.7 acquire an in-depth comprehension of the main concepts in the production and interpretation of building drawings

3.8 attain knowledge of costing buildings

3.9 understand trades and professions within the construction industry

3.10 research and utilise indigenous construction technologies and materials

4.0 SYLLABUS OBJECTIVES

Learners should be able to:

4.1 identify operatives, tradesmen and professionals in the construction industry
4.2 apply knowledge of safety and health precautions when working on a building site
4.3 choose appropriate tools, equipment and materials for a specific task
4.4 determine suitable sites for buildings
4.5 demonstrate trade and technical skills
4.6 interpret information given on building drawings
4.7 design and construct single storey structures
4.8 use ICT skills in building drawing and design
4.9 calculate quantities and cost buildings with the use of ICT or mechanically
4.10 explain the importance of building technology to the socio-economic development of the country
4.11 analyse the properties of building materials
4.12 demonstrate an understanding of designing and building as an enterprise
4.13 use indigenous construction technologies and materials in a sustainable manner to design and construct structures
4.14 demonstrate patriotism through community development projects
4.15 apply building regulations (by-laws) in design and construction

5.0 METHODOLOGY AND TIME ALLOCATION

5.1 Methodology

The syllabus is based upon interactive, learner - centred, sensory and hands on approaches. Principles of individualisation, concreteness totality, wholeness and stimulation must be applied to enhance the suggested teaching methods. These approaches and principles encourage curiosity and promote practical orientated learning whereby learners apply their experiences, knowledge, skills and attitudes independently. Linkage between theory and practice is strongly recommended in the learning and teaching of Building Technology and Design. The following are suggested methods:

5.1.1 Case study
5.1.2 Discussions
5.1.3 Project based learning
5.1.4 Educational tours
5.1.5 Blended learning
5.1.6 Experimentation
5.1.7 Problem solving
5.1.8 Discovery method
5.1.9 Demonstrations

5.1.10 Survey
5.1.11 Visual tactile
5.1.12 Gallery walks
5.1.13 School on the shop floor
5.1.14 Group work

Time Allocation

Eight periods of 40 minutes should be allocated per week TOPICS

The syllabus has the following topics:

5.1 Building Technology
5.2 Health and Safety
5.3 Building Tools and Equipment
5.4 Materials
5.5 Bonding
5.6 Site Works
5.7 Sub Structure
5.8 Super Structure
5.9 Design and Drawing
5.10 Quantities
5.11 Finishes
5.12 Services

6.0 SCOPE AND SEQUENCE CHART

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
6.1 Building Technology	• Introduction to building as a learning area • Importance of shelter • Careers in the construction industry	• Indigenous technology • Building as an enterprise	• Structure of the construction industry • Contracts and tendering procedures • Building as an enterprise	• Contracts and tendering procedures • Building as an enterprise
6.2 Health and Safety	• Common accidents in workshops and construction sites • Causes of accidents • Prevention of accidents • Protective clothing • Application of First Aid	• Safety on construction sites	• Regulations and Acts governing safety and health at work • Safety on scaffolds and ladders • Application of First Aid	• Personnel involved in safety and health in the workplace • Handling of hazardous substances • Application of First Aid
6.3 Building Tools and Equipment	• Hand tools • Care of tools and storage • Classification and maintenance of hand tools	• Scaffolding and safety	• Introduction to building equipment • Use, service and maintenance of building equipment • Care of equipment • Designs of storage shelves and racks	• Servicing and maintenance of scaffolds and ladders
6.4 Building Materials	• Materials used in the construction industry	• Quality of materials • Storage of materials	• Science of building materials • Conservation of the environment	

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
	• Indigenous and modern building materials • Conservation of the environment			
6.5 Bonding	• Half brick (115mm) and one brick (230mm) walls • Types of bonds	• Combination of bonds	• Bond solving • Stone work	• Bond solving
6.6 Design and Drawing	• Drawing and design equipment • Geometrical drawing • Computer aided design and drawing	• Computer aided design and drawing • Geometrical drawing	• Computer aided design and drawing • Pictorial and orthographic projections of single storey buildings	• Design project
6.7 Site Works	• Preliminary site works	• Environmental conservation and safety • Setting out	• Site operations • Building by- laws • Environmental conservation and safety	• Setting out instruments
6.8 Sub Structure	• Foundations • Environmental conservation and safety	• By- laws on foundations • Environmental conservation and safety	• Types of foundations	• Wall positioning on foundations
6.8.2 Floors		• Types of floors • Indigenous and modern floor finishes	• Types of floors • Indigenous and modern floor finishes	• Land scaping
6.9 Super Structure	• Walls	• Types of walls	• Forces on walls • Strengthening and stabilizing walls	• Prefabricated walls • garden walls

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
	• Wall openings	• Position of openings • Spanning of openings	• Fixing of frames to openings	• Fixing of frames to openings • Window sills, thresholds and stairs
	• Wall finishes	• Coping, pointing and jointing	• Tiling, cladding and wall papering	• Plastering and painting
	• Scaffolds		• Scaffolding	
	• Roofs	• Roofs and roof coverings	• Design and construction of roofs • Ceilings	
6.10 Quantities	• Areas and volumes	• Quantities of materials for a given structure	• Sub structure bill of quantities	• Bill of Quantities of structures
6.11 Services **6.11.1 Electricity**	• Sources of electricity • Safety when working with electricity	• Safety when working with electricity • Wiring	• Down transformers • Wiring • Resistance • Circuit breakers • Current reduction (voltage Drop) • Movement of electricity from the source • House installation	• Renewable energy
6.11.2 Plumbing			• Cold and hot water supply	

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
6.11.3 Sewage Disposal		• Dry and wet sewage disposal systems		• Water borne drainage systems

7.0 COMPETENCY MATRIX

FORM 1

7.1 **TOPIC 1: BUILDING TECHNOLOGY**

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.1.1 Introduction to Building as a Subject	• explain the term building technology • identify the importance of shelter • state building types and designs found in Zimbabwe • appraise the aesthetic value of existing buildings • describe historical development of human habitats	• Importance of Shelter - Types of shelter - Design, construction and maintenance of buildings - Historical perspective of human habitats in Zimbabwe • Building as an enterprise	• Conducting educational tours • Observing existing buildings • Listing types of building designs • Discussing aesthetic value of existing buildings • Sketching different types of shelter • Discussing the importance of shelter in a community • Comparing historical development of human habitats	• ICT tools • Recommended textbooks • Resource person • Buildings in the surrounding community • Print media • Historical monuments e.g. Great Zimbabwe, Khami ruins • Drawing materials Card boxes
7.1.2 Careers in Building Industry	• identify careers in the building industry • demonstrate the trades, professions and operatives	• Trades: - Carpenter - Brick layer - Plumber - Electrician - Plasterer - Painter • Professions:	• Listing the duties of trade persons and professionals • Demonstrating the trades, professions and operatives using readily available resources	• ICT tools • Recommended textbooks • Resource person • Buildings in the surrounding community • Print media

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
		- Architecture - Quantity surveying - Structural - Civil - Electrical • Operatives: - Carpentry and joinery - Bricklaying - Painting and decorating - Designing - Quantifying		• Drawing materials • Cardboard

7.2 **FORM 1**

TOPIC 2: HEALTH AND SAFETY

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.2.1 Causes of Accidents at the building sites and procedures to be taken for treatment	• identify causes of accidents at the building sites • perform fire drills periodically • memorise emergency numbers	• Causes of accidents at building sites such as: fall, defective tools, horse play, carelessness, slippery floors, long sleeves • Emergency call for help • Fire drills	• Identifying causes of accidents at the construction sites • Listing accidents that may occur at construction sites • Demonstrating emergency call and fire drills • Performing mock fire drills	• Reports and statistics on accidents • Recommended textbooks and materials
7.2.2 Methods of Accidents Prevention at Construction Sites	• describe methods of accidents prevention at construction sites	• Sensitization on accident regulations • Prevention methods: - Site working rules - Inspection of tools and equipment prior to work • Protective clothing - Work suits, helmet, gloves, hard boots/ safety	• Discussing methods of accident prevention and self-health practices • Identifying appropriate protective clothing for given tasks	• First Aid Kits • Stretcher beds • Resource persons

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
		shoes, masks, goggles		
	• carryout awareness campaigns in and outside the school	• Safe health practices (HIV Aids and other diseases)	• Designing awareness campaign materials • Campaigning in and outside the school	• Placards • Posters • Flyers
7.2.3 First Aid Equipment at work Sites	• identify First Aid equipment and materials at work sites • outline procedures to be taken for treatment of an accident victim • perform first aid procedures	• First Aid equipment • First Aid procedures	• Identification of First Aid equipment at work places • Role play of accident scene	• First Aid kit • Stretcher beds • Resource persons

7.3 TOPIC: TOOLS AND EQUIPMENT

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.3.1 Hand Tools	• identify hand tools • classify tools according to uses	• Tools: - mortar - alignment and measuring - digging - cutting	• Discussing and classifying tools according to their use • Demonstrating, handling and use of tools	• Recommended textbooks • Tool rooms • Charts • ICT
7.3.2 Preventive Maintenance	• clean tools after use • store tools after use	• Care and storage	• Explaining and demonstrating cleaning and storage of various tools • Demonstrating cleaning and storage of various tools • Storing of tools • Oiling • Greasing	• Recommended textbooks • Tool rooms • Charts • ICT tools

FORM 1

7.4 TOPIC 4: BUILDING MATERIALS

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.4.1 Materials used in the Building Industry	• identify building materials used in the conventional and indigenous technologies	• Modern building materials: - Bricks - Cement - Mortar - Concrete - River sand - Pit sand - Timber - Steel • Indigenous materials: - Grass - Timber - Bamboo - Earth Stone	• Classifying building materials • Discussing ways of improving strength of materials	• Samples of materials such as pit sand, river sand, cement, clean water • Recommended textbooks • Charts • ICT tools
	• use matrix, fine and coarse aggregates to make mortar and concrete	Mortar and concrete	• Observing building materials using gallery walk and site visits	• Samples of materials such as pit sand, river sand, cement, clean water

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
			• Demonstrating mixing of mortar and concrete	• Recommended textbooks • Charts • ICT tools
	• reduce environmental damage on sites	• Environmental conservation and safety	• Demonstrating sustainable environmental conservation measures	• Samples of materials such as pit sand, river sand, cement, clean water • Recommended textbooks • ICT

FORM 1

7.5 TOPIC 5: BONDING

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.5.1 Half brick (115mm) and one brick (230mm) walls	• define bonding • state types of bonds • apply rules and regulations of bonding • draw plans and elevations of walls	• Brick work bonds - Stretcher - Header - English - Water right bonding • Rules and regulations of bonding • Plans and elevations of bonds	• Defining bonds • Applying rules and regulations of bonding • Drawing plans and elevations of bonds	• Print media • ICT tools • Samples of bricks • Recommended text • Drawing equipment • Existing walls

FORM 1

7.6 TOPIC 6: DESIGN AND DRAWING

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.6 Design and Drawing	• identify drawing and design equipment • construct angles and shapes using geometrical instruments • apply ICT skills in design and drawing	• Drawing and design equipment: - drawing board - set squares - protector - compass - ruler • Geometrical construction of angles and shapes • Computer aided design and drawing	• Listing the drawing equipment • Stating the uses of equipment • constructing different angles and shapes • Computer aided drawing	• Recommended textbooks • Charts • Samples of objects • Drawing equipment and material • Existing structures • ICT tools

FORM 1

7.7 TOPIC 7: SITE WORKS

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.7.1 Preliminary Site Work	• select a suitable site for a building	• Factors influencing site selection such as terrain, soil type and climate • • Environmental conservation issues - preservation of trees outside the established site Wet lands	• Listing factors that influence choice of a site • Surveying land	• Tools and plant • School sites • Recommended textbooks • Charts • ICT tools
	• describe site clearance	• Site clearance such as removal of trees, grass	• Demonstrating site clearance	• School sites • Recommended textbooks • Charts • ICT tools •

FORM 1

7.8 TOPIC 8: SUB STRUCTURE

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.8.1 Foundations	• describe foundation • name types of foundations • state importance of foundations • give two ways of excavating trenches • explain safety measures to be taken on excavation sites • justify reasons for environmental conservation	• Foundations: - Purpose of foundations - Types of foundations: Strip Pad Raft Pile and beam • Manual and mechanical means of excavating trenches • Prevention of accidents at excavated sites • Methods of environmental conservation	• Defining the term foundation • Explaining the purpose of foundations • Describing the types of foundations • Discussing methods of excavating trenches • Describing measures taken to prevent accidents on excavated sites Discussing methods of conserving the environment	• ICT • Hand digging tools • Timber • Cutting saws • Resource person from industry Recommended textbooks

FORM 1

7.9 TOPIC 9: SUPER STRUCTURES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.9.1 Walls	• define terms associated with walls • explain functions and importance of walls	• Functions and importance of walls	• Defining terms associated with wall construction • Explaining functions and importance of walls	• Recommended textbooks • Print media • ICT tools • Drawings • Existing structures
7.9.2 Wall Openings	• explain the functions of wall openings on a building • build wall openings	• Wall openings: - Doors - Windows - Air vents - Permavents • Position of wall openings	• Explaining the purpose of wall openings • Constructing wall openings such as: door, window and air vent openings within the school/community	• Recommended textbooks • Print media • ICT tools • Drawings • Existing buildings
7.9.3 Wall Finishes	• define wall finish • identify indigenous and modern wall finishes	• Definition of wall finishes • Indigenous wall finishes: - Stone masonry - Rammed earth - Bamboo/ reeds • Modern wall finishes:	• Defining terms • Listing indigenous and modern wall finishes	• ICT tools • Recommended textbooks • Researched documents • Existing buildings • Print media • Resource person

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	outline the importance of wall finishes	- Plastering - Painting - Cladding - Tiling - Rough casting - Wall papering • Importance of wall finishes	• Discussing the importance of wall finishes Observing existing structures	
7.9.4 Roofs	• define a roof • state the functions of roofs	• Definition of a roof • Functions of a roof	• Defining the term roof • Discussing the functions of roofs	• ICT • Recommended textbooks • Research documents • Existing buildings • Print Media

7.10 TOPIC 10: QUANTITIES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.10 Areas and Volumes	• identify different shapes on existing buildings	• Shapes used on buildings: - Square - Triangle - Rectangle - Hexagon	• listing and drawing common shapes on buildings • calculating areas and volumes	• Existing buildings • ICT • Recommended textbooks • Researched documents

	• calculate areas of shapes and volumes of objects	- Circles areas and volumes of different shapes		• Resource persons • measuring tapes

FORM 1

7.11 TOPIC 11 :SERVICES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.11.1 Sources of Electricity	• state methods of electricity generation • illustrate methods of electricity generation	• Types of electrical sources - Hydro power - Thermal power - Fuel power - Solar power	• Describing the methods of electrical generation • Construct models of power generation • Conducting educational tours	• Cardboard boxes • Electrical wire • Electrical tools • ICT tools
7.11.2 Safety when working with electricity	• explain the risks associated with using electricity • apply first aid procedures	• Safety precautions - Safety clothing - Switch of switches (SOS) • First aid	• Discussing the risks associated with using electricity • Demonstrating first aid procedures	• First aid kit • Resource person • Recommended textbooks • Print media • ICT tools

FORM 2

7.0 COMPETENCY MATRIX

7.1 TOPIC 1: BUILDING TECHNOLOGY

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.1.1 Indigenous Technology	• outline indigenous and modern building technologies • compare indigenous and modern technologies	• Indigenous technologies such as: - Dagga and pole huts - Thatching - Stone/masonary • Modern technology such as: - Concrete walls and roofs - Brickwork - Processed timber - Metal sheeting	• demonstrating indigenous and modern technologies on buildings • Comparing indigenous and modern technologies in construction	• ICT tools • Recommended textbooks • Resource persons • Buildings in the surrounding community
7.1.2 Building as an Enterprise	• apply acquired skills for self-sustenance	• Building technology as an enterprise	• Appraising the benefits of studying	• ICT tools • Recommended textbooks

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• create jobs in the building industry		Building Technology and Design • Implementing acquired skills of self – sustenance • Conducting educational touring	• Resource persons • Buildings in the surrounding community

7.2 TOPIC 2: HEALTH AND SAFETY

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (ATTITUDES, SKILLS AND KNOWLEDGE)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.2.1 Safety on Building Sites	• describe methods of accidents prevention at construction sites • identify First aid equipment at work sites • outline procedures to be taken for the treatment of an accident victim	• Prevention methods: - Sensitization on safety regulation - Site working rules - Inspection of tools and equipment prior to work • First aid equipment • First aid procedures	• Discussing methods of accidents prevention and safe health practices • Using First aid equipment and procedures correctly • Role play of an accident scene	• Safety regulation pamphlets • by- laws • ICT • Construction sites • First aid kit • Stretcher beds • Resource persons

7.3 TOPIC 3: TOOLS AND EQUIPMENT

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.3 Scaffolding	• assemble simple dependent and independent scaffolds	• Scaffolding: - Independent scaffold - Drums and boards - Trestles - Dependent put log scaffold • Advantages and disadvantages	• Erecting the different types of scaffolds	• Safety regulation pamphlets • Building by- laws • ICT • Construction sites • Scaffolds • Ladders
	• identify accidents that may occur when using scaffolds and ladders • describe methods of preventing accidents when using scaffolds and ladders	• Common accidents using scaffolds and ladders • Safety regulations governing the use of scaffolds and ladders	• Identifying accidents that are associated with the use of scaffolds and ladders • Discussing regulations governing uses of scaffolds and ladders • Visiting construction sites	

7.4 TOPIC 4: BUILDING MATERIALS

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.4.1 Quality of Materials	• carry out tests for quality of materials	• Quality of materials: - River sand - Pit sand - Clean water - Cement - ¾ stones	• Carrying out tests for quality using both indigenous and scientific methods	• ICT tools • Recommended textbooks • Resource persons • Materials • Print media • Construction sites
7.4.2 Storage of Materials	• demonstrate safe methods of storing materials on a construction site	• Storage of materials on site: - Bricks - Sand - ¾ stones - Cement	• Practicing proper storage of materials on site	• ICT tools • Recommended textbooks • Resource persons • Materials • Print media • Construction sites

7.5 TOPIC 5 : BONDING

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.5.1 Combination of Bonds	• draw plans and elevations of walls in English, English garden wall and Stretcher bonds	• Plans and elevations of walls	• Drawing plans and elevations of walls in stated bonds	• ICT tools • Recommended textbooks • Resource person • Bricks • Stretcher bonds • Print media • Existing walls • Pictures of Great Zimbabwe • Drawing equipment
	• solve bonding problems up to one brick walls	• Bond solving: - Straight walls - T- junction walls - Return angle walls - Cross walls in Stretcher bond, English bond and English garden wall bond	• Solving bonding problems • Constructing walls in Stretcher bond, English bond and English garden wall bonds • Solving bonding problems at junctions and return angles	• ICT tools • Recommended textbooks • Resource person • Bricks • Stretcher bonds • Existing walls • Pictures of Great Zimbabwe • Print media

7.6 TOPIC 6: SITE WORKS

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.6.1 Setting Out	• list tools and equipment • interpret the plan • mark out and peg a rectangular and circular building • reclaim dongas and eroded areas within the school	• Tools and equipment: ○ Tape measure, site square, builders' line, lines and pins, hammer • Pegging ○ 3 :4: 5 and builders' square methods, diagonals, profiles, frontage line, trammel, line and peg method • Mark out • Environmental conservation issues such as preservation of trees and wet lands -	• Conducting educational tours • Establishing the site • Pegging the stand and house plan according to site plan • Practising setout rectangular and circular building • Erecting profiles • Discussing importance of trees and need for tree planting, benefits of wet lands • Rehabilitating eroded areas within the school	• ICT tools • Recommended textbooks • Print media • Drawing plans • Profile tools

7.7 TOPIC 7: SUB STRUCTURE

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.7.1 By-laws on Foundations	• determine the width and depth of a foundation trench	• By- laws on foundations: - Width and depth - Trial pit	• Deducing the width of a foundation trench of a given wall • Discussing factors that determine depth of a foundation	• ICT tools • Recommended textbooks • Model by- laws on building • Print media
	• explain brick footing procedures	• Brick footing	• Sketching of brick footing with correct sequence and procedures • Demonstrating brick footing using the correct procedure	• ICT tools • Recommended textbooks • Model by- laws on building • Print media • Excavation equipment and materials
7.7.2 Environmental Conservation and Safety	• explain how safety is ensured during and after excavation of trenches	• Safety during and after excavation	• Discussing methods of preventing animals and people from falling into excavated trenches	• ICT tools • Recommended textbooks • Model by- laws on building • Print media
	• describe safe methods of controlling termites	• Control of termites: - Methods - Chemicals	• Discussing methods of termite control	•

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• identify risks associated with use of chemicals		• Indicating risks of using chemicals on and the environment	
7.7.3 Floors	• list types of floors • name floor finishes • distinguish between solid ground floor and suspended ground floor	• Types of floors: - Rammed earth - Solid ground floor - Suspended ground floor • Indigenous and modern floor finishes: - Rammed earth - Tiling - Parquet/ wood block - Cement sand screed - Terrazzo - Carpet	• Listing floor types • Discussing differences in floor types • Giving advantages and disadvantages of each type of floor finish • Describing how each type of floor is constructed • Constructing a rammed earth floor	• ICT tools • Recommended textbooks • Print media • Rammers, hand compacter

7.8 TOPIC 8: SUPER STRUCTURE

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.8.1 Types of Walls	• explain functions of different types of walls • differentiate between load and non-load bearing walls	• Types of walls: - External wall - Partition wall - Boundary wall - Screen wall - Parapet wall • Load and non-load bearing walls	• Explaining the types of walls • Illustrating the types of walls • Observing the types of walls on existing buildings • Discussing the importance between load and non- load bearing walls	• Recommended textbooks • Charts • ICT tools • Existing structures
7.8.2 Wall Openings	• identify the correct position of openings on walls • list materials used to bridge openings	• Position of openings on buildings - Doors - Windows - permavents • Materials used to span openings: - Stone	• Discussing position of openings • Listing materials used to bridge openings • Explaining the various methods of bridging openings	• Recommended textbooks • ICT tools • Existing structures

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• explain the methods of bridging openings on a wall • cast different types of lintels and arches • fix door and window frames on a wall • draw sections and elevations of different wall openings	- Concrete - Timber - Bricks - Metal • Methods of spanning openings: - Brick on edge - Lintels (precast, cast- in -situ) - Arches	• Constructing arches, lintels, sills and thresholds • Fixing door and window frames on walls	
7. Roofs and Roof Coverings	• describe the types of roofs • identify roof coverings • sketch joints used to connect timber members on a roof • draw different types of roofs • construct a roof truss	• Types of roofs: - Gable roof - Flat roof - Lean- tool roof - heaped roof • Roof coverings: - Properties of roof coverings • Roof truss, wall plates and purlins	• Conducting educational tours • Discussing advantages and disadvantages of roof coverings • Making models of roof truss and roof covering	• Recommended textbooks • Existing structures • ICT tools •

7.9 TOPIC 9: DESIGN AND DRAWING

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.9.1 Computer Aided Design and Drawing	• draw plans and elevations of given objects/ structures	• Plans and elevations: - Brick - Walls - Corner block - Machine block - 2 roomed house	• Drawing plans and elevation of objects /structures	• ICT tools: autoCAD, ArchiCAD • Recommended textbooks • Pictures of structures • Existing structures
7.9.2 Geometrical Drawing	• draw object/ structure in pictorial views	• Pictorial views: - Isometric - Planometric	• Drawing pictorial views	• ICT tools • Recommended textbooks • Pictures of structures • Existing structures • Drawing equipment

7.10 TOPIC 10: QUANTITIES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.10.1 Quantities of Building Materials on Existing Structures	• calculate the number of bricks in a given wall • calculate the volume of plastering mortar • calculate the volume of aggregates from given mixes	• Quantities of bricks • Volume: - Mortar - Concrete - Cement - Aggregates	• Calculating number of bricks in a given wall • Calculating volume of plastering mortar for a given surface • Calculating volume of cement, pit sand, river sand and stones from given mixes	• ICT tools • Existing structures • Measuring equipment • Recommended textbooks

7.11 TOPIC 11: FINISHES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.11.1 Coping, Pointing and Jointing	• explain coping, pointing and jointing • give the importance of coping • state types of coping • analyse materials used for coping • demonstrate coping, pointing and jointing	• Coping ○ Types of coping ○ Materials for coping • Pointing and jointing ○ Methods of work	• Discussing various types of coping • Listing materials used for coping • Demonstrating pointing and jointing	• ICT tools • Existing structures • Measuring equipment • Recommended textbooks •

7.12 TOPIC 12 : SERVICES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.12.1 Application of Electricity	• wire a three-pin plug • apply safety precautions when using electricity	• Colour codes of electrical wires • The three pin plug • Safety when working with electricity	• Connecting wires to a three-pin plug • Discussing safety precautions	• Resource persons • ICT tools • Electrical wires • Three pin plug • Electrical safety devices • Recommended textbooks
7.12.2 Dry and Wet Sewage Disposal System	• identify sewage disposal systems • position a ventilated pit latrine on a settlement • position the septic tank with regards to buildings by- laws • draw plans, elevations and sections of the dry and wet systems of drainage	• Sewage disposal systems: - Ventilated latrines • Water closets and septic tanks	• Demonstrating siting and construction of the ventilated pit latrine • Drawing of plans, elevations and sections of the dry and wet systems of drainage	• Recommended textbooks • ICT tools • Existing structures • Resource persons • Drawing materials

7.0 COMPETENCY MATRIX

7.1 TOPIC 1: BUILDING TECHNOLOGY

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.1.1 Structure of the Construction Industry	• outline functions of professionals and trades persons in the parties involved • analyse the roles of professionals and trades persons	Parties involved •Clients party •Contractors party •Statutory personnel	• Outlining the duties of professionals, trades persons, statutory personnel and operatives • Distinguishing roles of professionals and trades personnel	• Recommended textbooks • Statutory instruments
7.1.2 Tender and Contract Documents	• explain the importance of contracts and tenders • outline tendering and contract procedures	• Tenders and contracts - Tendering - Tender documents - Types of tenders - Types of contracts - Contract documents	• Discussing the importance of tenders and contracts • Preparing tender and contract documents	• Tender and contract documents • Resource person • Print media • Recommended textbooks
7.1.3Entrepreneurship Skills in Building	• Prepare a business proposal •	• Entrepreneurship skills:	• Writing a project proposal	• Recommended textbooks • Print media

Technology and Design		- Project proposal -	• Practicing the business ethics	• Financial institutions • Resource persons

7.2 TOPIC 2: HEALTH AND SAFETY

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.2.1 Regulations and Acts Governing Health and Safety at Work	• exhibit understanding of safety and health practices • practise good housekeeping • perform HIV awareness campaign	• Regulations and Acts governing health and safety at construction sites • Good housekeeping • Safe working conditions • HIV awareness	• Applying good housekeeping at the practicing ground • Conducting educational tours to construction sites • Performing HIV awareness campaign	• Recommended textbooks • Regulatory A cts • ICT tools • Resource person
7.2.2 Safety on Scaffolds	• erect scaffolding and ladders in line with safety regulations	• Safety regulations governing the use of scaffolds and ladders	• Constructing independent, dependent scaffolding and ladders	• Ladders • Scaffolds • Safety regulation pamphlets • Building by-laws • Construction sites
7.2.3 Application of First Aid	• perform first aid procedures	• First aid equipment and procedures	• Role play of accident scene	• First Aid Kit • Resource person • Recommended textbooks • Print media

7.3 TOPIC 3: BUILDING TOOLS AND EQUIPMENT

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.3.1 Introduction to Building Plant and Equipment	• classify the plant and equipment • explain appropriate use of plant and equipment in construction industry	• Building plant and equipment for: - Site clearance - Site levelling and excavation - Setting out	• Exploring construction sites	• ICT tools • Work sites • Recommended textbooks • Print media
	• describe servicing and maintenance of building equipment	• Service and maintenance of building plant and equipment	• Researching on servicing and maintenance of building equipment	• ICT tools • Work sites • Recommended textbooks • Print media
	• design suitable storage for the equipment	• Storage of equipment	• Design and drawing storage for building equipment	• Drawing equipment • Servicing kit

7.4 TOPIC 4: MATERIALS

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.4.1 Science of Building Materials	• carry out experiments • examine properties of building materials	• Properties of indigenous building materials: - stone - Thatch - Pole and dagga	• Carrying out experiments • Identifying different properties of materials	• Different building materials • Laboratory • Zimbabwe ruins • Khami ruins
7.4.2 Conservation of the Environment	• observe the importance of natural resources to the community • analyse different methods of preserving the environment	• Importance of the natural environment resources • Effects of sourcing out materials to the environment • Methods of conservation	• Visiting virgin land • Identifying environmental affected areas in and around the school and community • Reclaiming eroded/degraded sites	• Rubble • Gravel • Broken bricks • Retaining walls

7.5 TOPIC 5: BONDING

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.5.1 Bond Solving	• apply rules of bonding • demonstrate knowledge of bond solving in different types of bonds • bond solve half brick walls into one brick walls • construct walls in different types of bonds • draw plans and elevations of the walls	• Types of Bonds: - Stretcher bond - English bond - English garden wall bond - Header bond • Special Bonds: - Basket weave bond - Water bond	• Defining broken bond • Applying rules and regulations of bonding • Drawing plans and elevations • Setting out and constructing straight, T junctions, cross walls and return angle walls	• Print media • ICT tools • Building materials and tools • Recommended textbooks • Existing walls

7.6 TOPIC 6: SITE WORKS

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.6.1 Setting Out	• describe environmental laws affecting wetland construction and protected plant species • explain by-laws governing setting out of buildings • describe the process of setting out a building • set out a building using the builder's square and 3,4,5 method • erect corner and side profiles • mark out foundation trenches	• Environmental laws affecting site clearance, wetland construction and protected plant species • By-laws governing setting out of buildings • 3,4,5 method and builders' square • Corner and side profiles • Ranging lines • Foundation trenches	• Assembling and erecting corner and side profiles • Observing by-laws from Environmental Management Agency (EMA) • Observing by-laws on setting out a building • Checking out diagonals • Marking out foundation trenches	• Setting out tools • Recommended textbooks • Resource person • ICT tools • Print media

7.7 TOPIC 7: SUB STRUCTURE

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.7.1 Pile and Bore	• explain the meaning of piling in foundation work • describe types of piles used in foundation work • illustrate methods of placing piles • differentiate between bearing piles and friction piles	• Piling in foundations • Types of pile: - Placement - Displacement • Methods of placing piles: - Boring for replacement - Displacement using hammer - Percussion method • Bearing piles and friction piles	• Drawing types of piles • Making models of different types of piles • Experimenting on effects of piling on clay soils	• Recommended textbooks • ICT tools • Timber • Resource persons • Tools
Floors	• differentiate a solid ground floor from a suspended ground floor • describe the constructional procedure for solid ground floors and suspended ground floors	• Types of floors - Solid ground floors - Suspended ground floors • Constructional requirements of floors • Floor finishes: - Granolithic	• Drawing and labeling diagrams of solid and suspended floors • Practicing fixing of selected floor finishes • Visiting existing buildings	• Recommended textbooks • Existing buildings • ICT tools • Print media • Floor materials

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• state the merits and demerits of each floor finish • demonstrate the process of fixing different floor finishes.	- Terrazzo - Tiles - Carpets - Stone - Brick - Timber • Fixing procedure for floor finishes		

7.8 TOPIC 8: SUPER STRUCTURE

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.8.1 Forces on Walls	• illustrate the different types of forces • calculate stress on a wall • describe methods of strengthening and stabilising walls	• Types of forces acting on walls: - Tension - Compression - Shear • Methods of strengthening and stabilising walls: - Reinforcement - Buttressing - Attached piers	• Making models showing the forces • Calculating stress • Constructing buttressed walls and attached piers	• Models • ICT tools • Recommended textbooks • Resource person • materials

7.8.2 Fixing of Frames to Openings	• describe the process of fixing door and window frames • fix window and door frames	• procedure in fixing of metal and wooden frames to openings	• Describing sequence of fixing window and door frames • Fixing frames to a wall	• Door and window frames • Recommended textbooks • ICT tools • Resource persons • Print media
7.8.3 Arches	• define arches • State reasons for using arches • construct arches	• Purposes of arches • Types: - Segmental - Semi- circular • Arch terms • Geometrical construction of arches	• Geometrical construction of arches • Constructing arches using building units	• Recommended textbooks • ICT tools • Resource persons • Drawing equipment • Construction materials • Templates • Existing structures
7.8.4 Design and Construction of Roofs	• illustrate roof forms • define roof terms • state methods of fixing roof covering materials • design and construct roof trusses	• Roof forms, component parts and functions • Construction and erection of timber roof trusses • Timber pitched roofs up to 7,5m span • Roof covering materials • Details of eaves and verges	• Designing roof trusses • Constructing models of roof trusses • Visiting existing buildings	• Recommended textbooks • ICT tools • Models of roof trusses • Existing buildings • Print media

7.9 TOPIC 9: DESIGN AND DRAWING

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.9.1 Computer Aided Design and Drawing	• design building plans • draw plans and elevations of given structures • draw structures in pictorial views	• Working drawings - Site plan - Floor plan - Elevations - Cross section • Pictorial views: - Isometric - Planometric	• Designing different structures • Fitting in the plan on to the site plan • Observing building lines • Drawing plans and elevation of structures • Drawing pictorial views	• ICT tools: AutoCAD, ArchCAD • Recommended textbooks • Pictures of structures • Existing structures • Print media • Drawing equipment

7.10 TOPIC 10: QUANTITIES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.10.1 Sub structure Bill of Quantities	• calculate the quantities of materials for a sub structure bill of quantities • calculate the cost of labour required to execute the activities involved in the sub structure	• Site clearing • Reduced level dig • Setting out • Sub structure - Trench excavations - Trench levelling - Footing concrete - Footing brickwork - Backfilling and compaction - Termite prevention - Electrical tubing - Oversite concrete	• Calculating the area to be cleared • Calculating the volume of reduced dig, trench excavations and volumes of materials • Calculating the labour costs of carrying out the substructure activities	• Recommended textbooks • Working drawings • ICT tools • Print media

7.11 TOPIC 11: FINISHES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.11.1 Plastering	• identify the different backgrounds that are plastered • identify plastering tools • demonstrate plastering skills	• Backgrounds to receive plaster • Plastering tools • Procedures: - Preparations - Application	• Preparing the background to be plastered • Selecting appropriate plastering tools	• Plastering tools • Plastering materials • Recommended textbooks

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
			• Demonstrating required plastering skills	
7.11.2 Painting	• identify types of paints • prepare a background to receive painting • select the appropriate tools for a painting task • use painting tools correctly	• Types of paints - Water based - Oil paints • Backgrounds to receive paint • Painting tools • Procedures: - Surface preparation - application	• Identifying the types of paints appropriate for different backgrounds • Selecting appropriate painting tools • Preparing a background to receive painting • painting a surface	• Painting tools • Recommended textbooks • Paint • Paint catalogues • ICT tools • Surfaces to be painted

7.12 TOPIC 12: SERVICES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.12.1 Movement of Electricity from the Source	• Calculate power reduction from the source to the consumer	• High and low voltage • Industrial usage of electricity • Domestic usage of electricity	• Applying different phases • Conducting educational tours	• First aid kit • Resource person • Recommended textbooks • Print media • ICT tools

7.12.2 House Installation	• Analyse use of by-laws • Describe the function of a distribution board	• Usage of by-laws • Distribution board - Lights - Plugs - Geysers - Cooker -	• Applying by-laws when installing electricity Designing an electric circuit model	• Resource person • Recommended textbooks • Print media • ICT tools • Cardboard boxes • Electric cables
7.12.3 Hot water Supply	• Differentiate between direct and indirect hot water supply systems • identify pipes used for hot water supply • demonstrate distribution of hot water supply	• Direct and indirect hot water supply • materials used for water pipes • Distribution of hot water from the geyser to the point of use • Sources of energy for hot water	• Discussing systems of hot water supply • Selecting materials used for hot water pipes • Demonstrating the distribution of hot water from the source to the point of use	• Recommended textbooks • Water supply materials • Resource persons • Plumbing tools

FORM 4

7.0 COMPETENCY MATRIX

7.1 TOPIC 1: BUILDING TECHNOLOGY

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES

7.1.1 Tender and Contract Procedures	• invite tenders • respond to tenders • draft contract documents	• Tendering • Types of tenders • Types of contracts	• Preparing tender documents • Responding to tender documents • Composing contract documents	• Recommended textbooks • Statutory instruments • Tender and contract documents • Print media
7.1.2 Entrepreneurship Skills in Building Technology and Design	• Exercise ethical business practices (Ubuntu/Unhu/Vumunhu) • Demonstrate knowledge of company formation procedures • Explain ways of sourcing finances	• Entrepreneurship skills: - Company formation and business registration - Business ethics • Business growth	• Practicing the business ethics • Explaining legal requirements in company formation and registration • Sourcing for financial help	• Recommended textbooks • Print media • Financial institutions • Resource person

7.2 TOPIC 2: HEALTH AND SAFETY

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.2.1 Personnel involved in Health and Safety in the Work Place	• demonstrate the evacuation and handling of injured persons at a building site • express knowledge of the duties of health and building inspectors	• Duties of health and building inspectors	• Role playing of the evacuation and handling of injured persons • Discussing the duties of health and building inspectors	• NASSA Inspectors • Local Government Inspectors • Local Authority • Recommended textbooks

7.2.2 Handling of Hazardous Substances	• use and handle hazardous substances in line with regulations • recognize signs and symptoms of a poisoned person	• Regulations of handling hazardous substances: - Colour codes - Safety clothing - Disposal of empty containers - Signs and symptoms of a poisoned person	• Demonstrating the correct use and handling of the hazardous substances • Making charts with colour codes • Attending to a poisoned person	• Empty poison containers • Protective clothing • Print media • Resource persons
7.2.3 Application of First Aid	• apply First Aid procedures • evacuate a poisoned person • call for help	• First Aid equipment and procedures	• Applying first aid to poisoned persons	• First Aid Kit • Resource persons • Stretcher bed

7.3 TOPIC 3: BUILDING TOOLS AND EQUIPMENT

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.3.1 Servicing and Maintenance of Scaffolds and ladders	• identify faults on scaffolds ladders and accessories • carry out maintenance of scaffolds and ladders	• Scaffolds and ladders - Certificate of fitness	• Servicing and maintaining scaffolds and ladders	• Scaffolds • Ladders • Recommended textbooks • Resource persons

7.4 TOPIC 4: MATERIALS

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.4.1 Science of Building Materials	• carryout slump and cube tests • identify the properties of indigenous and modern materials	• Properties of building materials • Modern materials: - Bricks - Blocks - Steel - Concrete - Cement	• Carrying out experiments • Recording the results of the experiments	• Laboratory • Different building materials • Recommended textbooks • Modern structures • ICT tools • Resource persons
7.4.2 Conservation of the Environment	• identify eroded sites in and around the school • apply different methods of conservation to the environment • conduct awareness campaigns in the community	• Methods of conservation • Conservation of: - soil - vegetation	• Reclaiming degraded sites • Exercising land conservation campaigns	• Peat from old dumping areas • Organic material from cleared construction sites • Resource persons • Recommended textbooks

7.5 TOPIC 5: BONDING

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.5.1 Bond Solving	• demonstrate the ability to solve bonding up to 2 brick thick walls • construct walls up to 2 brick thick • draw plans and elevations up to 2 brick thick walls • construct boundary walls and decorative walls in stonework	• Bond solving of: - Straight walls - junction walls - return angle walls in stretcher, english and english garden wall bonds • Rules and regulations of bonding • Plans and elevations of walls • Stonework - Ashlar - random rubble	• Bond solving • Constructing walls using bricks, blocks, stone work • Drawing plans and elevations up to 2 brick thick walls	• Print media • Existing walls • Recommended textbooks • ICT tools • Drawing equipment • Bricks, blocks and stonework

7.6 TOPIC 6 : SITE WORKS

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.6.1 Setting Out Equipment	• mount the levelling instruments • record readings from a levelling staff • calculate rise and falls • do a mathematical checking	• Setting out instruments: - dumpy level - theodolites • Use and care of setting out instruments	• Measuring distances • Constructing angles on the ground • Transferring levels using line levels, straight edges and bonning rods • Levelling pegs using the instruments • Recording readings using standard format	• Recommended textbooks • Setting out instrument • Resource persons • ICT tools

7.7 TOPIC 7: SUB STRUCTURE

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.7.1 Wall positioning on Foundations	• plumb down from ranging lines • raise corners • determine forces that act on foundations	• Plumbing down • Procedures when raising corners • Forces acting on foundations	• Plumbing down from ranging lines • Raising corners using gauge rods, tingle plates, corner blocks and line levels • Explaining forces that act on foundations	• Recommended textbooks • ICT tools • Building tools

7.8 TOPIC 8 : SUPER STRUCTURE

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.8.1 Prefabricated Structures	• state merits and demerits of prefabricated structures • list different materials used for prefabricated structures • state the functional requirements of	•Prefabricated structures - Materials - Functional requirements - Designs - methods of assembling	• Visiting sites with prefabricated structures • Designing and assembling prefabricated structures • Model making • Research on prefabricated	• Recommended textbooks • Models • Resource persons • ICT tools

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	prefabricated structures • design and assemble prefabricated structures		structures using traditional materials	
7.8.2 Garden Walls and Retaining Walls	• explain functions of garden and retaining walls • design garden and retaining walls	• Types of garden and retaining walls: - functions - designs • Forces acting on retaining walls	• Visiting areas with garden and retaining walls • Designing garden and retaining walls • Making models	• Recommended textbooks • Drawing equipment • ICT tools • Existing walls
7.8.3 Thresholds and Stairs	list materials for thresholds and staircases • state regulations governing the construction of thresholds and staircases • design a staircase	• Materials for stairs • Constituent parts and layout of thresholds and stairs with landing • Constructional details of thresholds and staircases	• Identifying materials • Explaining term associated with thresholds and stairs • Visiting existing buildings • Designing thresholds and staircases •	• Thresholds and stairs cases • Recommended textbooks • ICT tools
7.8.4 Ceilings	• state functions and functional requirements of ceilings • identify materials for ceilings • describe types of ceilings and methods of fixing	• Functions and functional requirements • Materials for ceilings • Types of ceilings and methods of fixing	• Explaining functions and functional requirements of ceilings • Discussing types of ceilings and methods of fixing • Conducting educational tours	• Recommended textbooks • ICT tools • Ceiling materials • Resource person • Ceiling on existing buildings

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• fix ceilings		• Fixing a ceiling • Repairing ceiling at school/community	
7.8.5 Landscaping	• state reasons for landscaping • identify materials for landscaping • describe constructional requirements for roads and driveways • landscape a given area using available materials	• Types of landscape developments: - Rockery - Pavings - Flower beds - Fish ponds • Materials for landscaping: - Bricks - Stones - Bitumen	• Discussing aesthetic value of landscaping • Carrying out practical activities on landscaping • Visiting public places	• ICT tools • Recommended textbooks • Landscaped areas • Existing buildings

7.9 TOPIC 9: DESIGN AND DRAWING

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.9.1 Design project	• apply knowledge of the design process to solve a given situation • construct models	• Stages of design process: - situation - design brief - investigations	• Researching on given situations • Designing building plans • Observing by-laws	• ICT tools: AutoCAD, ArchiCAD • Recommended textbooks

		- possible solutions - working drawings - evaluation	• Making models • Evaluating the designs	• Pictures of structures • Existing structures

7.10 TOPIC 10: QUANTITIES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.10.1 Bill of Quantities of Super Structure	• calculate the quantities of materials used in the super structure • estimate the cost of labour required to execute the activities involved in the superstructure	• Walls: - brickwork - blocks - plastering - painting - rhinoset plaster - concrete • Window and door openings • Roofing timber • Roof covering materials: - roof tiles - asbestos cement sheets	• Calculating the quantities of different materials required • Estimating the costs of labour needed to construct the super structure	• Working drawings • Existing structures • Recommended textbooks • Building materials • Resource persons

		- galvanized iron sheet • Brick force		

7.11 TOPIC 11 : FINISHES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.11.1 Tiling	• identify types of floor and wall tiles • demonstrate use of tiling tools	• Floor tiles • Fixing procedures • Types of tiles - Ceramic - Vynil - Porcelain - Stone • Wall tiles - Ceramic	• Conducting educational tours • Identifying different types of tiles suitable for walls and floors • Practicing laying of wall and floor tiles	• Existing buildings • Recommended textbooks • Samples of tiles • Tiling tools • Adhesives • Models
7.11.2 Cladding	• describe cladding • explain the methods of fixing cladding	• Materials used for cladding • Fixing of cladding - Prefabricated cladding units - Fastening materials	• Conducting educational tours • Cladding surfaces	• Existing buildings • Recommended textbooks • Cladding tools • Fastening materials • Models
7.11.3 Wall Papering	• select appropriate wall papers to suit different building interiors	• Wall papers - Functions and functional requirements:	• Discussing functions and functional requirements • Conducting educational tours	• Wall papers • Adhesives • Photographs • Recommended textbooks

		• Wall paper printing techniques - Surface printing - Digital printing - Screen printing	• Applying wall paper	• Existing buildings

FORM 4

7.12 TOPIC 12: SERVICES

KEY CONCEPT	OBJECTIVES Learners should be able to:	CONTENT (knowledge, values, attitudes, skills and dispositions)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
7.12.1 Renewable Energy	• identify equipment used in renewable energy systems • describe how bio gas digester and solar panels work • Design and construct bio gas digester for school/community •	• Solar energy equipment: - solar panels - invertors - batteries - cables - light bulbs • Bio – gas • Bio gas digester	• Discussing the uses of the different energy equipment • Sketching solar energy production system • Sketching bio gas digester system • Designing and constructing bio gas digester for school/community • Conducting educational tours	• Resource persons • Solar and bio gas energy production equipment • Recommended textbooks • Models • Refuse •

7.12.2 Water Borne Drainage Systems	• differentiate the public sewer from the septic tank system • describe the treatment of effluent	• Conveyance of effluent from the building to the septic tank and main sewer line • Treatment of effluent: - septic tank - sewage ponds	• Explaining the operational systems of septic tank and public sewer • Discussing the treatment of effluent • Making models of septic tank and sewage ponds • Conducting educational tours to sewage treatment plants	• Recommended textbooks • Resource persons • Existing infrastructure • Models • ICT tools

8.0 ASSESSMENT

Learners shall be assessed through School Based Continuous Assessment (SBCA) and Summative Assessment (SA). These assessments shall be guided by the principles of inclusivity, practicability, authenticity, transparency, flexibility, validity and reliability. The principles are crucial for creating a supportive and effective learning environment that fosters growth and development in learners. Arrangements, accommodations and modifications shall be visible to enable candidates with special needs to access assessments.

This section covers the assessment objectives, the assessment model, the scheme of assessment, and the specification grid.

8.1 ASSESSMENT OBJECTIVES

By the end of the course learners will be expected to:

8.1.1 state functions of different operatives, tradesperson and professionals in the building industry
8.1.2 describe health and safety measures in the building industry
8.1.3 identify tools, equipment and materials used in Building Technology and Design
8.1.4 demonstrate the correct use of any building tool and material
8.1.5 conduct experiments to determine the strengths, durability and quality of building materials
8.1.6 describe the safety and environmental conservation practices on any building site
8.1.7 solve bonding problems in Stretcher, English and English garden wall bonds up to 230mm wall thickness
8.1.8 design and construct a structure from a given brief
8.1.9 demonstrate ICT skills in building drawing and design
8.1.10 calculate quantities of building materials and labour costs for any given construction work
8.1.11 define terms used in Building Technology and Design
8.1.12 outline the importance of Building Design and Technology
8.1.13 interpret and evaluate building designs
8.1.14 apply acquired skills to solve real life situations in building
8.1.15 demonstrate the use of indigenous technologies and materials in the design and construction of structures
8.1.16 demonstrate knowledge of building regulations (by- laws) in design and construction

8.2 ASSESSMENT MODEL

Assessment of learners shall be both Continuous and Summative as illustrated in Figure 1. School Based Continuous Assessment shall include recorded activities from the School Based Projects done by the learners. The mark shall be included on learners' end of term and year reports. Summative assessment shall include terminal examinations which are at the end of the term and year.

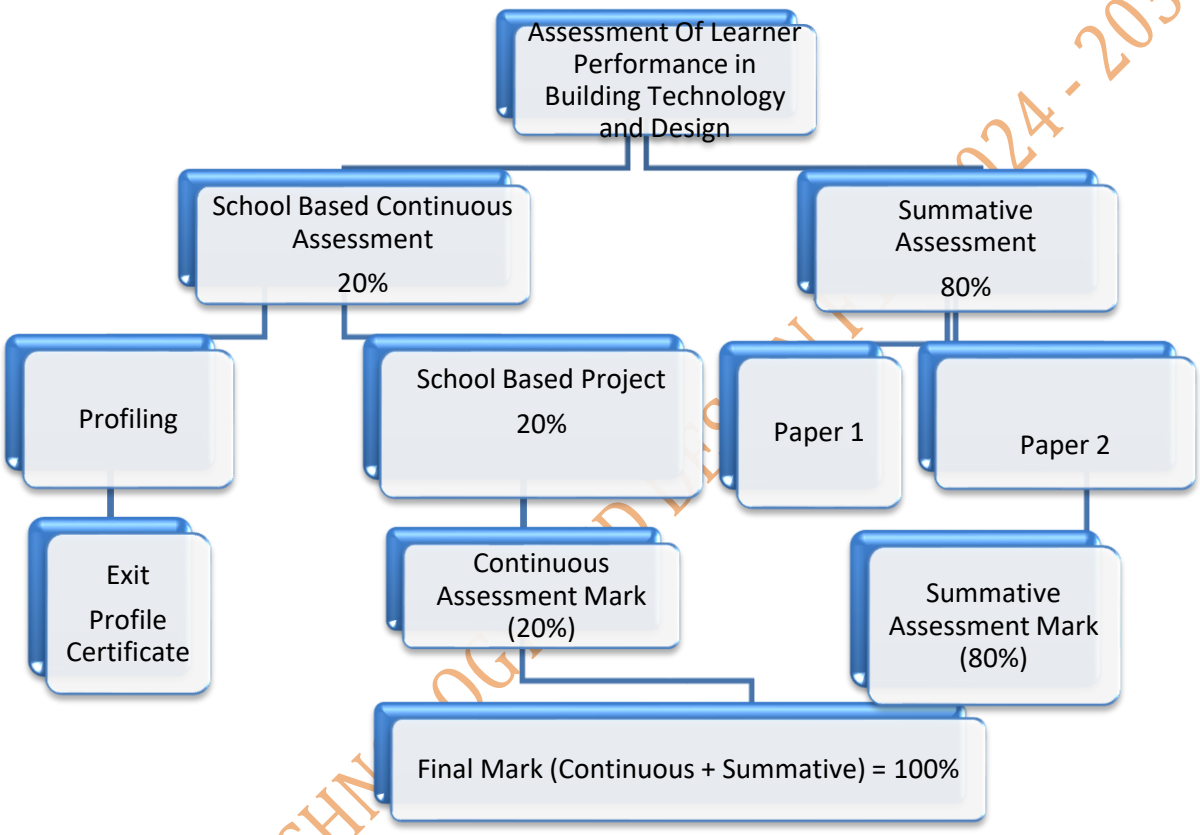

Fig. 1 Assessment Model

In addition, learners shall be profiled and learner profile records established. Learner profile certificates shall be issued for checkpoints assessment in schools as per the dictates of the Teacher's Guide to Learning and Assessment. The aspects to be profiled shall include learner's prior knowledge, values and skills, and subsequently the new competences acquired at any given point.

8.3 Scheme of Assessment

Learners at Lower secondary level will be assessed using both School Based Continuous Assessment and Summative Assessment. From Forms 1 to 4, learners will do one school-based project per form, per year and per learning area which will contribute 20% to the end of term and year mark. Public examination candidates are expected to complete two

(2) school-based projects per learning area at form 3 and 4 level, which will contribute 20% to the final mark at Form 4.

FORM OFASSESSMENT	WEIGHTING
Design Project	20%
Summative Assessment	80%
Total	100%

8.4 School – Based Project: Continuous Assessment Scheme

The Table given below shows the Learning and Assessment Scheme for the School Based Project.

Project Execution Stages	Project Stage Description	Timelines	Marks
1	Problem Identification	January	5
2	Investigation of related ideas to the problem/innovation	February	10
3	Generation of possible solutions	March	10
4	Selecting the most suitable solution	April-May	5
5	Refinement of selected solution	June	5
6	Presentation of the final solution	July	10
7	Evaluation of the solution and Recommendations	August-September	5
	TOTAL		**50**

The learning and assessment scheme shows the stages that shall be executed by pupils and the timeline at which each stage shall be carried out. Possible marks, totalling 50, are highlighted to indicate how much can be allocated.

8.5 Description of the Summative Assessment

Summative assessment consists of two (2) papers of equal weighting.

Paper	Paper type	Marks	Duration	Weighting
1	Structured questions	80	3 hours	40%
2	Practical examinations	80	3 hours	40%
TOTAL				**80%**

8.6 SPECIFICATION GRID

OBJECTIVES/COMPONENTS	PAPER 1	PAPER 2
Knowledge with understanding	40%	20%
Practical skills and their application	40%	60%
Decision making and judgment	20%	20%
TOTALS	**100%**	**100%**

8.7 SUMMATIVE ASSESSMENT

Paper 1: Theory, drawing and quantities

The paper consists of 3 Sections i.e. Section A, Section B and Section C

SECTION A **12** compulsory structured questions on building construction, design, drawing and quantities will be answered

SECTION B **3** questions will be answered out of **5** questions on building construction

SECTION C **1** question out of **2** will be answered on drawing and quantities

TIME **2 hours 30 minutes**

WEIGHTING 40%

PAPER 2 – PRACTICAL

A practical test piece based on brickwork and plastering will be set. Candidates will be required to work from dimensioned sketches, written descriptions or scaled drawing.

TIME: 3 hours 30 minutes

WEIGHTING 40%